

The Computer Magazine for Power Users

MEETING NOTES - MARCH 10, 1985

The March meeting of LIST was held at Harvey R's in Valley Stream. Outgoing President Nazir Pashtoon called the meeting to order at 2:30PM.

The Sec'y Treas. provided membership, renewal and funds status reports.

Elections were held for the Presidents position and Jaff Street was elected unanimously. General discussion centered around the newsletter. The overwhelming majority of the membership expressed their support for the content and editorial balance of LISTing. The consensus was however, that larger, darker print was needed, particularly for program listings. The Sec'y Treas. was asked to request all members, via LISTing, to do the following in preparing material for the newsletter.

- 1) Do not use Timex paper in the 2040 printer.
- 2) Radio Shack's paper (black) is recommended.
- 3) Use Dick Scovilles "BOLD" program, reprinted, and annotated, elsewhere in this issue.
- 4) Use another printer, but try to use 32 column format. This makes visual verification somewhat easier.

The newsletter editor was requested to provide instructions for using Dick's program. This has been done. The question of tape loading was reopened. There is clearly a lack of understanding of this procedure and/or a lack of suitable equipment among the membership. The editorial staff will research the various newsletters and magazines for data on Loading and Saving techniques. Members who have solved LOADING problems are urgently requested to send in descriptions of the methods they use to help LOAD balky tapes. A future issue of the newsletter will be dedicated to this subject.

NEXT MEETINGS

Next LIST meeting will be in Centerport, N.Y. at 2:00PM on April 14th, 1985. See the "members only" page for directions.

The May meeting will be on May 5th, probably in Seaford.

Membership size is growing rapidly. If you know of an available church, school, library, etc., at which we can hold our Sunday meetings please bring your information to the April meeting.

The business portion of the meeting adjourned at 4:PM.

DEMOES

Nazir P. Demoed his ROM based emulator in a smart looking black box. Your editor received an earlier version (no black box) two months ago and has found compatibility to be at least 99% (E.g., Chequered Flag, Inferno, Survival, etc. all run).

Free copies of TS Horizons, graciously supplied by Rich Duncan, were distributed to those in attendance. John B. demoed some of the software he has been developing; very impressive, commercial quality, stuff.

After the meeting and demoes, Zebra Systems provided two TS book titles to the membership at \$5.00 each. LIST Associates sold ROM's for \$15, 16K RAM packs for \$5.00 (all gone) and ~~ported~~ ^{from} Timex software for \$1.00 each (Picked up at meeting).

NEXT MEETING

Paul D. and Nazir will demonstrate Spectrum networking and perhaps the RS-232 port on Interface I. We hope also to get P.W.C.'s-QL- and Bob G.'s RGB monitor together for a QL demo. There's a good chance that someone from Zebra will bring a Zebra Talker, as well.

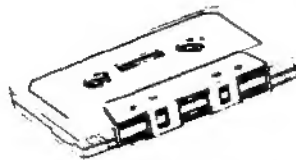
NOTE: QL-RGB monitor specs - Sinclair Research has sent Paul C. the necessary info. We'll publish it in May's LISTing.

Uncle Clive Wants You!

LISTing needs articles, particularly those of a straight forward, BASIC nature. Our newer members, in particular, need to know what you may now consider "old hat". Please share your discoveries and knowledge with them.

LIST GROUP
P.O. BOX 438
CENTERPORT, N.Y. 11721-0438

LIST



April
1985

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MAILER	
LIBRARY SAMPLER (May or may not be Published)	

LIBRARY TAPE NOTES

We wish to apologize to all of our members for the poor quality of Tape #2. While changes in staffing of the library have caused some confusion, our big problem appears to have been our Sears dubbing deck. This has been sent out for repairs. The 4 "defective" programs on tape #2 will reappear on #3.

Our thanks to H.L.W. Pulliam for pointing out the problem.

Also, please note that some copies did not have the write protect tab removed. If you have the tape in your possession now, we ask that you break it out, right now, to prevent accidental erasure of the program. We have received partially erased "master" tapes back in the past.

By the same token, some of the member supplied tapes have been erased or have unusable noises on them. We will be more careful (and unfortunately slower) in producing tape #3. You are requested to do likewise. Please double check that your programs LOAD before sending out the tape.

To help in this endeavor, tape #3 will contain an "alignment" section. If you have a spare type player, we strongly recommend that you adjust its head alignment to the LIST standard.

LISTing Policy:

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Copies provided on exchange basis with other bona fide user groups.

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Your reviews, programs, comments, hardware projects, etc., are eagerly solicited for publication in LISTing.

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Please note our new address - P.O. BOX 438, Centerport, N.Y. 11721-0438
Mail sent to the old address must be forwarded there and will take longer to reach us.

NOTE: PARTIAL YEAR MEMBERSHIPS AVAILABLE

Normal membership year is Feb. through Jan. at cost of \$15.00.(US.)
By keeping as many members as possible on that basis, we keep our costs and chances of error down.

If you wish to begin subscribing later in the year, please sign up for the end of this year and all of next.

We will accept partial years or different subscription runs, on a limited basis (particularly from members outside the U.S.) But, please be aware that, addition to possible rate increases, your "account" must be handled "by hand" and errors may occur. International (EX Canada) subscribers will receive as many issues as we can afford to mail.

POLICY ON CONTRIBUTED MATERIAL:

We are always looking for interesting articles, programs, reviews etc. We keep our members informed and entertained. Articles submitted for publication are printed on the following basis:

1. You, the writer, maintain the full copyright and can resell, lend or give away your work, as you wish.
2. We are granted the right to publish your material, in the original issue in which it appears. Reprints (e.g., to supply orders for back issues) will include your material as a part of its original issue. We are not allowed to sell your material in any other way, without your express written consent.

We can't (for now) pay you for your material, but you will receive a copy of the issue in which it is published, even if you're not a member. You may get more than one issue and you will definitely earn the respect and appreciation by your grateful peers.

Articles represent the opinion of the author and not necessarily the LIST Group. LIST disclaims any responsibility for anything you may do to your computer as a result of reading any article in LISTing.

Classified Ads

WANTED: MEMOTECH RS-232 INTERFACE FOR T/S 1500.
A. NIEUWENHOFF 16 HERITAGE RD. SUTTON, MA. 01527

OK'Tronics Light Pen (for Spectrum - works on 2068 buss)
\$35.00 (includes P & P) LIST Associates, 10 Idle Day Drive,
Centerport, N.Y. 11721.

If you have a program or article about something you've tried, please send it in. Our group interacts so we varied that I can almost certainly guarantee that someone else can use your expertise to solve his problem.

HARDWARE REVIEW:

ZEBRA GRAPHICS TABLET

FOR: TS 2068
FROM: ZEBRA SYSTEMS, INC.
78-06 JAMAICA AVENUE
WOODHAVEN, N.Y. 11421
PRICE: \$89 - INCLUDES ZEBRA PAINTER SOFTWARE ON CASSETTE

The Zebra "Graphics Tablet" is not so much a single hardware item, as it is a system which allows the user to create graphic screens on the TS 2068, quickly and easily. The system consists of three components; a KOALA technology tablet, the Zebra dual port A/D interface, and Zebra Painter software. We'll discuss each in turn, and then look at the use of the whole system.

The Koala "pad" has been reviewed in detail in a recent issue of Byte⁺ magazine, but will be briefly described here. The pad consists of a flat black plastic drawing surface about 4" wide by 5" high mounted in a beige frame which slopes down toward the user. The pad's rear is about 1 1/2" higher than the front and sports an umbilical which terminates, at the computer end, with a 6 pin DIN type plug. The pad's entire surface is, in essence, a variable resistor. by pressing down on a particular spot with either finger or the stylus provided, the user causes a discrete voltage level to be sensed by the A/D interface. Any single spot on the pad has a unique X and Y coordinate resistance. Resolution is said to be 256 X 256. The pad has two large "command" buttons just above the drawing area. These are used to select menu items, indicate the starting points of lines and tell the system you are finished with a command or function.

Zebra's A/D (analog to digital) interface is a small (2 1/2" X 3") single sided open board. It sports two six pin DIN jacks, one for each of its two analog ports (A&B). The board plugs onto the expansion buss connector at the rear of your 2068 and provides a male edge connector for feed through to other peripherals (e.g., the printer). In addition to the edge connectors and DIN jacks, the board has 14 available (DIP) holes which can be used to access the two ports, a fairly common A to D convertor chip, and a chip for very simple decoding and the requisite resistors for biasing and set points.

Decoding involves the use of A4,5,6,7, RD & IOREQ (any port below 'F') while the ADC itself uses A1,2 & 3, and A0 feeds the ADC's clock input.* There are, in effect then, eight channels for analog data on Zebra's board. For the 'B' port, the one used with the graphics tablet, these are:

0,1 = X axis (0 to 255)
2,3 = Y axis (")
4,5 = Right Button
6,7 = Left Button

Similarly:
8,9 = X axis (A Port)
10,11 = Y axis (")
12,13 = Right (A)
14,15 = Left (A)

When not using the Koala pad, the user can treat the "button" ports as conventional analog ports. Port A uses the odd number ports. Outputs for the ADC go directly to the 2068 data buss. The two ports allow you to use analog joysticks (try Radio Shack), temperature sensors (thermistors) and some types of photocells, as well.

+ MARCH 1985

* This last is a very clever design trick, which helps reduce parts count. Without giving away the "secret", let's just say that it would be a valuable mental exercise to visualize the state of A0 as your Z80 executed its instructions. Can you also see potential problems with this method?

The final component of the Zebra System is Jeff S.'s Zebra painter software. While not as comprehensive as some of the Spectrum graphics software, it should still provide a more than adequate screen drawing environment, particularly for the novice. Extensive use of on-screen menus is made. The user has only to point the stylus at the section of the Koala pad which corresponds to the screen item desired, and touch the control button to have the job done. The Software features Ink and Paper, Line and Circle commands, the ability to exchange the active screen with one in memory, a Lefty feature, pixel coordinate axes, orthogonal lines mode, and others.

Pictures can be saved on tape and/or TIMEX printer. Zebra painter is easy to duplicate, and instructions for so doing are provided. Finally, you are permitted to add text to the drawing and change the brush to a pen, if desired.

Overall, I found the system easy to set up and use for graphics development. The small (3" X 4") manual supplied, while not perfectly printed, should be adequate for most users. The board was neatly constructed and cleverly designed and laid out.

On the negative side, I'd like to have seen the unit in a case and the numbers not scraped off the chips (it takes me 10-15 minutes longer to figure out what they are, that way). While I applaud Jeff Streets Zebra painter software, particularly in light of the time constraints he worked under, I would like to have seen a few more features included. Specifically, "Painter" could use: Fill, Box and Triangle commands. The documentation, while adequate for the tablet, should have included information on other uses of the A/D interface; e.g., voltage levels, sources of DIN plugs, addresses, the use of the BASIC IN statement, etc.

At \$89 the Zebra Graphics Tablet System is a good value. The software, tablet and interface (which has many other uses) can serve as a valuable addition to your TS 2068, and can save hours of time for those of us interested in developing our computer graphic skills. I give the system an 8.5 out of 10. Technical documentation and more advanced software would each have earned the system .5 more points.

Two final points; one good; one bad. First, the bad news; due to a number of factors (Software and sampling rates, are two) the graphics system suffers from what Jeff S. calls "spray". This consists of extraneous dots which appear in the vicinity of your stylus point when you either move too fast, or relax your pressure on the pad for an instant. These must be erased to make a good drawing. This is easy to do, but still an inconvenience. On the plus side, the graphics interface is theoretically ZX81, TS1000 and Spectrum buss compatible. I've tried it on my "Spectrum" (a 2068 with ROM and a 2068 with Spectrum buss and emulator), using the IN command and it works.

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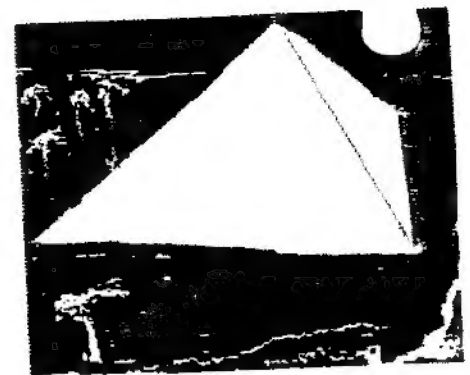
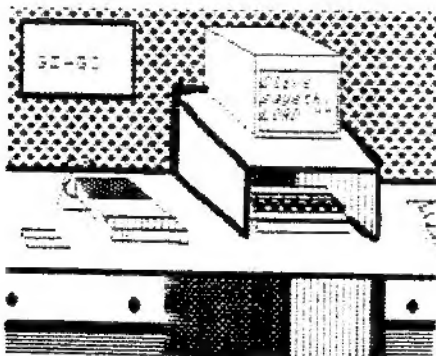
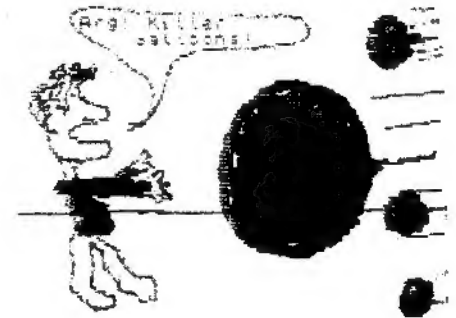
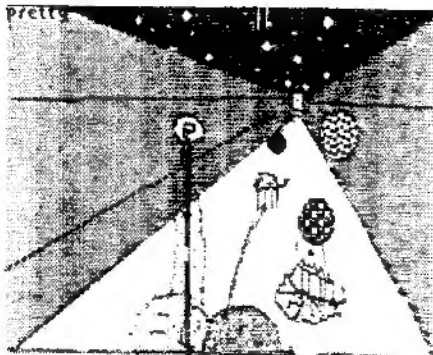
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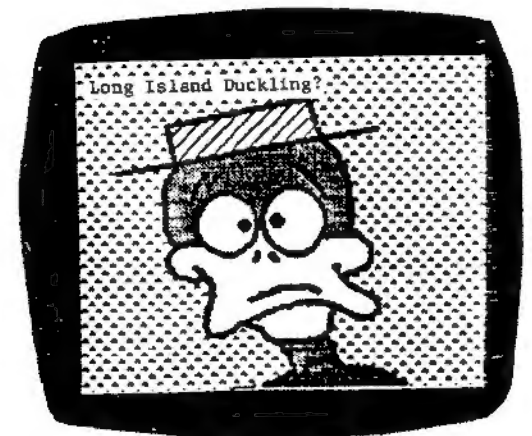
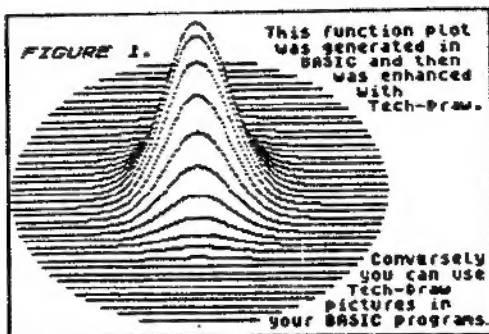


Graphics

List Group



Manually Enhanced



DOMSDOS

One of our new members, Don Ross (formerly a CEO for a large Computer Corporation and now engaged as Manager of Previously Owned Vehicle Dispositions, for Montauk Studebaker) has provided us with this BASIC listing. He obtained this from one of the British Magazines. DOMSDOS is a complete DOS, written in BASIC, which, it is claimed, will work on any U.K. Domestic (thus DOMS) microcomputer. I believe DOM's transcription contains an error or two, as I got an error message (variable not found) the first time I tried to run it. If anyone can adapt this to run on the TS 2068, please let us know.

Quick-Reference Keyboarding Guide

ABS (G)	LOAD (J)
AND (shifted-Z)	LPRINT (shifted-S)
ARCCOS (S)	
ARCSIN (A)	NEW (A)
ARCTAN (D)	NEXT (N)
AT (C)	NOT (N)
BREAK (SPACE)	OR (shifted-W)
CHR# (U)	PAUSE (M)
CLEAR (X)	PEEK (O)
CLS (V)	PI (M)
CODE (U)	PLOT (O)
CONT (C)	POKE (O)
COPY (Z)	PRINT (P)
COS (W)	
DELETE (shifted-0)	RAND (T)
DIM (D)	REM (E)
	RETURN (Y)
EDIT (shifted-I)	RND (T)
EXP (X)	RUN (R)
FAST (shifted-F)	SAVE (S)
FOR (F)	SCROLL (B)
FUNCTION (shifted-ENTER)	SGN (F)
	SIN (O)
GOSUB (H)	SLOW (shifted-D)
GOTO (G)	SOR (H)
GRAPHICS (shifted-9)	STEP (shifted-E)
	STOP (shifted-A)
IF (U)	STR# (Y)
INKEY# (B)	
INPUT (I)	TAB (P)
INT (R)	TAN (E)
	THEN (shifted-3)
LEN (K)	TO (shifted-4)
LET (L)	
LIST (K)	UNPLOT (W)
LLIST (shifted-G)	USR (L)
LN (Z)	VAL (J)

From McGraw-Hill

April
1985

LIST GROUP

```

5 REM "DD"
7 REM DOMSDOS
10 RESTORE
20 LET U=1: LET N=0: LET I=0
30 DIM E$(100)
40 READ E$(1): IF E$(1)="" THEN
50 REM -HOME- PRINT U: TAB 3-T
60 PRINT "DOMSDOS"
70 PRINT "VERSION 1.3"
80 PRINT "(C) COPYRIGHT STATE
HATCHERIES, 1984"
90 PRINT "PRINT"
100 REM CCP ROUTINES
110 INPUT A: INPUT A: "AS"
111 REM INPUT "A" AS
120 IF AND(1) (M2 THEN PRINT A$
121 PRINT: GO TO 110
130 REM ERGOT ROUTINES
140 IF S=Z THEN LET S=INT (RND+
(U)*N+U)
141 REM +++
150 PRINT: PRINT E$(S): PRINT
151 REM E$(S)
160 IF S=0 THEN LET S=S+1: IF A
ND+(U)*2 (U THEN LET S=Z
161 REM RND +++
170 GO TO 100
180 DATA CANT CONTINUE ERROR
181 REM CANT
190 DATA FRANKLY CANT CONTINUE
ERROR
191 REM CANT
200 DATA CANT TAKE ANY MORE ERR
OR
201 REM CANT
210 DATA BOOS ERR ON P
220 DATA DISC DRIVE INOPERABLE
230 DATA MAIN BUS FAILURE ERROR
240 DATA ARE YOU SURE
241 REM SURE?????
250 DATA I MEAN ARE YOU REALLY
SURE
251 REM ???
260 DATA COMMAND NOT RECOGNISED
270 DATA REBOOT AND RETRY
280 DATA DIVISION BY ZERO ERROR
290 DATA DIVISION BY ZERO ERROR
AGAIN
300 DATA PLEASE RECONSIDER
301 REM SIDER..
310 DATA PLEASE PLEASE RECONSID
ER
320 DATA PRESSING WRONG KEYS ER
ROR
330 DATA FIRE ON MAIN BOARD ERR
OR
340 DATA YOU CAN'T BE SERIOUS
ERROR
341 REM CANT--IOUS!
350 DATA TRY KEYING HELP
351 REM HELP
360 DATA KEY SYSSEN TO RECOVER
361 REM SYSSEN
370 DATA ILLEGAL QUANTITY-CALL
POLICE
380 DATA OUT OF MEMORY
390 DATA OUT OF SIGHT
400 DATA OUT OF MIND
410 DATA TOO MUCH
411 REM MUCH
420 DATA TOO COMPLEX
430 DATA MUCH TOO COMPLEX
440 DATA NEXT WITHOUT FOR
450 DATA FOR WITHOUT NEXT
460 DATA FOR WITHOUT FOR
470 DATA NEXT WITHOUT NEXT
480 DATA GOTO UNDEFINED
490 DATA GO TO UNDEFD NOT PAS
ED DO NOT COLLECT 200
491 REM $200
500 DATA BAD SUBSCRIPT
5010 DATA NAUGHTY SUBSCRIPT
5020 DATA EVIL SUBSCRIPT
5030 DATA SYNTAX ERROR
540 DATA SYNTAX CURRENTLY 15
541 REM 15%
550 DATA FILE LOCKED
560 DATA FILE MISSING
570 DATA FILE MISSING BELIEVED
KILLED IN ACTION
580 DATA LANGUAGE NOT AVAILALE
590 DATA LANGUAGE NOT PRINTABLE
600 DATA UNSPEAKABLE ERROR
610 DATA PROGRAM TOO LARGE
620 DATA PROGRAM TOO SMALL
630 DATA RANGE ERROR-RIM HIGHER
640 DATA WRITE PROTECTED
650 DATA REALLY WRITE PROTECTED
660 DATA READ PROTECTED
670 DATA READ AND WRITE PROTECT
ED
530 DATA NOT WORTH READING ATAL
L FRANKLY
690 DATA END

```

More on Darkening the Printer Dick Scoville

My original plan was to make the following program an example in this month's machine code tutorial and explain it line by line, but it requires some familiarity with so many things that it's best just to give it as is. The idea is very simple: Write a new character set. Don't panic, the program itself will do all the work for you in the twinkling of an eye. Here is the program, in Z80 mnemonics and in decimal and in hex--all 29 bytes of it:

```

57786 LD DE,0000      56576
57789 PUSH DE
57798 LD BC,0003      768
57793 LD HL,(365C)    CHARS
57796 INC H
57797 LD A,(HL)
57798 AND A
57799 RRA
57800 OR (HL)
57801 LD (DE),A
57802 INC HL
57803 INC DE
57804 DEC C
57805 JR NZ,F6        57797
57807 DJNZ F4        57797
57809 POP HL
57810 DEC H
57811 LD (365C),HL    CHARS
57814 RET
57815 NOP
57816 NOP
57817 NOP

```

```

17  0   221 213 1   0   3   42
54  92  36  126 167 31  182 18
35  19  13  32  246 16  244 225
37  34  54  92  201

```

```

11  00  00  05  01  00  03  2A
36  5C  24  7E  A7  1F  B6  12
23  13  00  20  F6  10  F4  E1
25  22  36  5C  C9

```

Do the following:

- 1) CLEAR 56575
- 2) LET sdt=57786
- 3) Enter the 29 bytes of code starting at address 57786
- 4) Peek them to be sure they are OK.

Now RANDOMIZE USR sdt will give you a new alphabet, which will be used by LPRINT, LLIST and COPY from now on. If you want to recover the old original alphabet, simply POKE 23607,60.

Yes, we're reprinting Dick Scoville's fine Darkening program again (thanks too, to Triangle User Group). There seems to have been a little confusion on how to enter and use it.

The first listing given is assembly code. You cannot enter this unless you have an assembler. What Dick is doing here is copying the existing character set into high RAM (above 56576), all 768 bytes of character codes, while rotating each character to the RIGHT one dot and superimposing this "new" version over the old (OR (HL)). This puts an additional dot to the right of each original one in a character and gives the impression of bolder print.

The second and third listing give the decimal and hexadecimal values of the codes for the machine code instruction. For example:

MEM LOC	Decimal Value	Hex Value	Assembler Code	Means
57786	17	11	LD DE,	Load the DE Register Pair with the next two bytes you find
57789	0	00	00	The addresses are always "backward", so this is DD00.
57788	221	DD	DD	
which is: 56576				
		DD00	DD00	This will be the start of our "alphabet"
also: 54,92				
		36,5C	5C36	The original character set in ROM is pointed to by this System variable.
which is: 23606				

Examples of Machine Code Loaders are to be found in a number of the library programs. In this case, it might be just as easy to write one. Follow Dick's instructions and use the following program (or your own) at step 3.

```

1  REM Clear 56575
2  REM Let sdt = 57786 (sdt is the start of Dick's code)
10 Restore
20 For I = sdt to sdt+29
30 Read a: POKE I,a
40 Print I; " "; a; " "; FREE I
50 Next I
55 DATA 17,0,221,213,1,0,3,42
56 DATA 54,92,36,126,167,31,182,18
57 DATA 35,19,13,32,246,16,244,225
58 DATA 37,34,54,92,201,0,0,0
60 Stop
100 Randomize USR sdt
110 LIST

```

Make sure all the values are correct e.g., 57518 should contain 201, the RETURN (to BASIC) command. If a value is wrong, simply poke it with the correct number. Once all has been entered correctly GOTO 100 and your machine code is safely tucked away above RAMTOP.

You can now safely nuke the MC loader program out of existence. (We assume you SAVE'd either the LOADER program and/or the CODE already. If not, save the program in the normal way, for posterity); save the code with SAVE "BOLD" CODE 56575, 1240. Then, to use "BOLD" simply LOAD "BOLD" CODE and Randomize USR 57786. To return to a standard character set; POKE 23607, 60. (What would happen if you POKE it with 221?)

Please use "BOLD" whenever you send in a program listing for publication in LISTing. This will make your listing much more legible, especially when photo-reduced.

Again our thanks to Dick Scoville for a useful routine and one simple enough to help us learn to use Machine Code.

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* That's one 16 and one 1 for a total of 17 decimal.

Communications

TBBS SYSTEM PROTOCOL

This section explains how TBBS handles the following features: Auto-Login, File uploading and downloading, and message entry and retrieval. If you have never used a TBBS system before you should print or save to disk a copy of these instructions. They will help answer some of the more common questions asked about how to use TBBS.

1. AUTO LOGIN

For Auto-Login, TBBS sends your terminal a decimal 5 (Control-E) at the "First Name?" question. Your terminal software should respond to this by sending your log on in the following format:

Firstname;Lastname;City,State

(Note the semi-colons separating the different portions with no spaces before or after them.)

2. UPLOADING PROGRAMS

TBBS supports four different upload methods (protocols). These are:

1. Prompted mode. The prompt character is the '^' (greater than) character. The reason for utilizing a prompt character is to allow a delay to occur when the system is writing to the disk. The prompt will not reappear until the system is ready to receive the next line of text. To use this mode your terminal software must stop sending after each (CR) (carriage return) until it receives the next '^'. You terminate the upload by typing 'END'. No input data line may be more than 255 characters long in this mode.

2. X-ON after (CR). This mode is very similar to the prompted mode. Your terminal program must stop sending after each carriage return and wait for an X-ON (Ctrl-S) to be sent by TBBS before continuing. You terminate the upload by typing 'END' on a new line. The 255 character maximum line length still applies in this mode. Again, you terminate by typing END after a carriage return.

3. X-OFF/X-ON. In this mode your terminal program sends characters until it receives an X-OFF (Ctrl-S) from TBBS. Your terminal program then waits for an X-ON (Ctrl-Q) to resume sending. It must ignore any other characters (except to display them if desired) while waiting for an X-ON. In this mode, there is no limitation on line length. You still terminate this mode by entering END after a carriage return.

4. CP/M NODEM Protocol. This is a public domain file sector transfer protocol first used by the CP/M community. Any terminal program which supports this protocol may be used. This is by far the most secure file transfer method since the data is checked for integrity and re-transmitted automatically if a bad character is received.

3. DOWNLOADING PROGRAMS

TBBS supports three protocols for program downloading:

1. ASCII with Buffer Control Codes. To use this mode your terminal program must recognize a Ctrl-Q as a code for opening its buffer. That is, when your terminal program receives the Ctrl-Q it should start spooling all incoming data to a memory buffer. Upon receipt of a Ctrl-Q it should stop spooling to the buffer. You then should have some method of dumping your memory buffer to a disk or tape file. Any non-ASCII software which appears in a download section will be sent as an ASCII hex representation of the machine language program. It is then necessary to convert this hex code back to the standard (END) type file. Programs to do this are available as public domain software from many sources. Some terminal software packages have it included either as a separate program or built into the buffer mode.

2. ASCII only, no control codes. In this mode TBBS just sends the file data only. You must capture it as best you can. A non-ASCII file will still be converted to an ASCII hex data format as in method 1.

3. CP/M NODEM protocol. This is the same error checking protocol described above in UPLOAD but with TBBS on the sending end. It is compatible with the public domain NODEM.X series of CP/M programs.

4. X-ON, X-OFF Flow Control

TBBS supports X-ON, X-OFF flow control at all times when it is sending you data. At any time you may transmit the X-OFF (Ctrl-S) character and TBBS will instantly stop sending you output. Send X-ON (Ctrl-Q) to resume data flow to you. This allows your terminal program to stop character flow while it spools to disk anything you are saving. It also provides a means of manually stopping in menus and other areas where the 'P' for pause feature will not work.

5. FULL DUPLEX OPERATION

TBBS operates in a full duplex configuration and is always looking for command input when it is sending output to you. This means that you do not have to wait for a menu to finish listing to give your next command. The command will be acted on after the next letter is printed on output. During Message or Text File output (such as this) the 'P' key will halt after the next character transmitted. When in this pause state a carriage return (CR) will resume with the next character, and an 'S' will abort the rest of the printout. Menu commands are always one character and do not require a (CR).

6. HELP IN HIGHER LEVELS

When you initially log onto the system you are in the beginner user level. In this level the system supplies many helpful explanations and lengthy prompts. Also each command menu is fully displayed. If you set your user level higher the prompts become much shorter to save transmission time. If you need help, however it is close at hand. At the Command: prompt press '?' at any time to get a full menu listing. A (CR) will give you the intermediate display in Expert and Super Expert modes or the beginner display if you are in the intermediate mode.

7. MESSAGE ENTRY METHODS

TBBS supports three forms of message entry. These are the line mode, prompted block mode, and unprompted block mode. The line mode is intended for manually typed in messages (the most common type). It prompts for each line with a line number and the count of characters left in the message buffer. The two block modes are intended to allow uploading of messages which were prepared off-line and are transmitted in a block by a smart terminal program. The prompted block mode supplies a '?' prompt for each line and behaves much as the prompted upload described above. The major difference is that instead of typing 'END' on a line to stop, a null line (CR) after the prompt character will terminate message entry. The unprompted block mode is for terminal programs which do not support prompted upload. In this mode the echo is shut off and characters may be sent in a continuous stream (even at 1200 baud) until either two (CR)'s in a row (equivalent of a null input line) or the buffer limit of 2048 characters is reached. The most usual problem area in block message input to TBBS is when you wish to include a blank line in your text. You must put at least one space in the line or it will be interpreted as the end of the message being entered. When you have entered your message you will be given a set of options as follows:

(L)ist, (C)ontinue, (E)dit, (S)ave, or (A)bort?

(L)ist displays your entered text without word wrap and with each line numbered. The numbers are used for editing if you wish. Remember that TBBS will word wrap your message when it finally displays it so the lines may not come out exactly as you expect them.

(C)ontinue will place you in the line mode at the end of your message so you may add onto it.

(E)dit will ask you for a line number. Enter the number of the line you wish to change (as shown by (L)ist) and the current line will be displayed. You then re-type just this line as you want it to be.

(S)ave will save your message to the system's disk message base and exit back to the menu.

(A)bort will give up on entering this message. All text will be thrown away and you will be returned to the menu as if you had never done the enter message command.

Our Thanks to Herbert W. for this download.

To the customer:

Now you have bought your interface 1 you may be interested to know of some of the Microdrive compatible software currently available. The following list is of products which are currently endorsed by Sinclair as being Microdrive compatible. Except where stated they are not published by Sinclair, and Sinclair can therefore take no responsibility nor accept any liability for their quality nor fitness for the purpose for which they are being sold. The list is for information only and is intended to give you an opportunity of taking advantage of the Microdrive's fast loading facilities. The majority of these products allow you to take a back-up copy of the cassette onto a Microdrive cartridge, thus enabling you to load the product in seconds instead of minutes. In addition most of the programs allow you to store data relevant to the program on Microdrive cartridge.

Most of these products are available in the shops. Should you wish to contact the suppliers direct, however, their names are given below, and addresses overleaf.

PROGRAM NAME	TYPE	SUPPLIER
Cash Controller	Business	Richard Shepherd Software Ltd
Supercode II	Utility	Supersoft Systems
Editor Assembler	Utility	Picturesque
Spectrum Monitor	Utility	Picturesque
Paymaster	Business	Wilden Services Ltd
Masterfile	Business	Campbell Systems
Stock Control	Business	Kemp Ltd
Sales Ledger	Business	Kemp Ltd
Purchase Ledger	Business	Kemp Ltd
Hisoft Pascal	Utility	Hisoft
Hisoft Devpac	Utility	Hisoft
Bank Account system	Business	Bridgebrook Intek
Sales Ledger	Business	Hestacrest Ltd
Purchase Ledger	Business	Hestacrest Ltd
Cash Book	Business	Hestacrest Ltd
Nominal Ledger	Business	Hestacrest Ltd
Machine Code Test Tool	Utility	Oxford Computer Publishing Ltd (OCP)
Full Screen Editor/Assembler	Utility	OCP
Address Manager Plus 80	Business	OCP
Finance Manager Plus 80	Business	OCP
VAT Manager Plus 80	Business	OCP
Word Manager Plus 80	Business	OCP
Word Manager Standard	Business	OCP
Stock Manager Plus 80	Business	OCP
The Runes of Zendo	Adventure Game	Dorcas Software
D/E Accounts	Business/Educational	Cases Computer Simulations Ltd
Statspak 1	Business/Educational	Cases Computer Simulations Ltd
Friendly Face (cassette or on cartridge)	Utility (Provides for transfer of programs from cassette to cartridge)	Monitor Ltd
Business Bank Account	Business	Transform Ltd
Sales Day Book	Business	Transform Ltd
Purchase Day Book	Business	Transform Ltd
Stock Control	Business	Transform Ltd
Payroll	Business	Transform Ltd
Invoicing	Business	Transform Ltd
Superfile	Business	Transform Ltd
Sales/Purchase Ledger/Invoicing	Business	Transform Ltd
Reversi (also known as Othello)	Strategy Game	Games of Skill Ltd
16/48 (the monthly cassette magazine)	Magazine	16/14 Magazine Ltd
Matrix Operations/Linear Program	Utility	University Software
Regression/Statistics	Utility	University Software
Library of Advanced math/stat/econ	Utility	University Software
Timeword II	Word Processor	Tarman Software
Logo	Teaching Language	Sinclair Research Ltd

Most of these software titles are available in the shops. If you wish to contact the appropriate supplier yourselves please use the following address and phone numbers:

Sinclair Research Ltd
Stanhope Road
Camberley
Surrey
GU15 3BR
Tel: (0276) 489311

Richard Shepherd Software Ltd
Elm House
23-25 Elmshott Lane
Slough
Berks

Supersoft Systems
91 Manor Road
Higham Hill
London
E17 5RY

Picturesque
6 Corscove Hill
West Wickham
Kent
BR4 9BB

Wilden Services Ltd
20 Beaconsfield House
Beacon Road
Crowthorne
E Sussex
TN6 1AX

Campbell Systems
15 Rows Road
Buckhurst Hill
Essex
IG9 6BL

Kemp Ltd
43 Muswell Hill
London
N10 3PN

Cases Computer Simulations Ltd
14 Langton Way
Blackheath
London
SE3 7TL

Monitor Ltd
P O Box 442
Mill Hill
London
NW7 2JF

Transform Ltd
41 Kests House
Porchester Mead
Beckenham
Kent

Games of Skill Ltd
1 Francis Avenue
St Albans
AL3 6BL

16/14 Magazine Ltd
10 Barley Mow Passage
Chiswick
London
W4 4PH
Tel: 01-994-6477

University Software
28 St Peter's Street
London
N1 8SP

Hisoft
180 High Street North
Dunstable
LU6 1AT

Bridgebrook Intek
45 Bursleigh Avenue
Wokingham
Surrey
RG40 7JG

Hestacrest Ltd
P O Box 19
Loughton Buzzard
Essex

Oxford Computer Publishing Ltd
Brimford
46 High Street
Chalfont St Peter
Bucks
SL9 9GB

Dorcas Software
3 The Ouse
Glenfield
Leicester

Software houses with commercial products compatible with the Microdrive, and wishing their products to be added to this list should write to the following address:

The Software Manager, Sinclair Research, Stanhope Road, Camberley, Surrey, GU15 3PS

Try this:

```

5 CLS : BEEP .5,1 : POKE 23600
75 : POKE 23688,3
10 INPUT "CASSETTE #, OR TITLE" : AS
20 PRINT "LOADING" : "AS," "A"
30 DRAW 0,178 : DRAW 207,0 : FLO
T 207,0 : DRAW 0,178
40 LOAD "+++"
100 PRINT "TOOK" : "AS," "B"
LOAD "+++"
9999 SAVE "LIST" : BEEP .5,1 : CLS
PRINT "REWIND, PLAY TO VERIFY"
FV1 : VERIFY "LIST" : BEEP .5,1 :
PRINT "VERIFIED!"

```

LIST GROUP

CATALOGS RECEIVED

ACE Software
2 East Oak Avenue
Moorestown, N.J. 08057

Aerco
Box 18093
Austin, Tx 78760

Macshak Software
73-312 Ironwood Street
Palm Desert, Ca 92260

Technology Research Ltd
Unit 18, Central Trading Estate
Staines, Middlesex TW184XE
England

Tasman
Springfield House, Hyde Terrace
Leeds LS29LN
England

Software Supermarket
87 Howards Lane
London SW15 6NV
England

Magnetic Media of New England
PO Box 780
Beverly, Ma. 01915

Quick Silva - Spectrum
Susan Ziegler
14307 Ben Brush
San Antonio, Tx 78248

Lmar Ltd
POB 4442
Oceanside, Ca. 92054 -0835

Thos. Woods
PO Box 64
Jefferson, N.H. 03583

Curry Computer
5344 West Baniff
Glendale, Az

English Micro Connection
15 Kilburn Ct.
Newport, RI 02840

Quick Silva - 2068
Knights Computers
702 Highland Street
Fulton, N.Y. 13069

D. Lipinski Software
2737 Susquahana Road
Roslyn, Pa 19001

Sunset Electronics
2254 Taraval Street
San Francisco, CA 94116

National Software Library
42 Harefield Avenue
Cheam Surrey SM 27NE
Great Britain

Has 2 programs for the TS1000 & 2068; 'PAYOFF'
Helps you manage your charge accounts.
Payout - for home budgeting - Price \$14.95 each

Disc Drives \$99.
Interface for 2068, called FD68, has 64K RAM on
board \$199. & RGB Interface - TS 2068 only
Also - parallel or Serial Interfaces, separately
at \$69 & \$99.

Has programs for 2068 & 1000 - examples: Keno for
2068 \$19.95 + \$2. P&H - Investica for 2068
\$19.95+ 2 P&H (Funds management)

Beta Disc Drive £ 95 + £ 17.50 P&H
for Spectrum 48K
We have catalog & some magazine reviews.

Complete line of word processors & interfaces for
the Spectrum, Tasword II \$13.90 Phone (0532)
43801

Good assortment of Spectrum Software - some
hardware - Takes Visa - Prices - Full list
including VAT, even on overseas orders.
01-789-8346 (24 hours)

Nashu a DS/DD diskettes \$1.09 each (for fifty)
+ 2.50 P&P. Fast Service (617) 927-0905

Games - Spectrum (512) 492-8054

H. News-Soft

Will buy or sell your Timex product e.g.:
TS 1500 Buy @ \$20.25 - Sell @ \$27.00

Profila 2068 - Tom Bent's improved ZX81 ROM,
& other hardware & software.

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Spectrum Products at very good Prices -
no Plastic.

Games - 2068 - 315-593-8219

A software buyers Guide - \$20.00 - Covers All
TS vendors in the US.

(415)-665-8330 Virtually a
Complete stock of hwr &
Software. List prices or below
Takes plastic

Membership \$ \$3.00
See Steve Tibbles letter

ong
sland
inclair
imex
G group

We have received catalogs from most US and some U.K. Vendors of hardware and Software.
Check the library for our catalog file. Ask too about the "junk mail" catalogs if you're
interested in items for other computers (e.g., we just received one for the T199 computer
which seems to have good prices)

- A & J Microdrive, 1050 E. Duane Ave., Suite 1, Sunnyvale, CA, 94086
 Aardverk, 2352 S. Commerce, Halled Lake, MI, 48038
 AB Engineering, 11096 Clair, Hartland, WI, 53029
 Ace Software, 2 E. Oak, Norcross, GA, 30057
 Ack-doh Enterprises, 12924 Claxton Drive, Laurel, MD, 20704
 Addison Wesley Publishing Co., Jacob Way, Reading, MA, 01867
 Parvulesch Adrian, 31-20 54th Street, Suite 10, Queens, NY, 11377
 AFR Software, 1605 Penn Ave #204, Miami Beach, FL, 33139
 Aerco, Box 18093, Austin, TX, 78760
 Alexeff Engineering, 2790 Tufpholke, Oak Ridge, TN, 37030
 Alpha Electronics, PO Box 1088, Alpha, NJ, 08065
 Anchor Automation, 6913 Val Jean Avenue, Van Nuys, CA, 91405
 Appropos Technology, 1071-A Avenida Acaso, Camarillo, CA, 93010
 arizoftx, 6501 East Monterosa Street, Scottsdale, AZ, 85261
 Audiograph Co., 3584 Leroy, Ann Arbor, MI, 48103
 Audio Vision, 1279 N. Normandie, Los Angeles, CA, 90027
 I. Auerbacher, 41 King Street, Belleville, NJ, 07109
 Banta Software, 6068 Highland Way, Orangevale, CA, 95662
 Bantam Books, 666 5th Ave, New York, NY, 10103
 Carlog Software, 401 N. Geyer Rd, Kirkwood, MO, 63122
 Basic, 3705 Dismayne Blvd, Miami, FL, 33137
 Basically Programming, 2528 W. Olive Avenue, Fullerton, CA, 92633
 Andre Baune, 304 Scott, Chateaugay, Quebec, Canada J6J 4H5
 Jerry Bennett Software, 1405 Carling Ct, San Jose, CA, 95111
 Blocal Software, 340 Cypress Drive, Fairfax, CA, 94530
 Cirkhauser Boston, Inc., 300 Green St, Cambridge, MA, 02139
 The Boston Computer Society, Three Center Plaza, Boston, MA, 02108
 Robert J. Brady Co., Bowie, MD, 20715
 Brainchild Computer Works, POB 506, Pewaukee, WI, 53072
 Russell Brewer, 26630 N111 Rd, Frazersburg, OH, 43822
 Brooklyn Closeout Corp., 167 Clymer Street, Brooklyn, NY, 11211
 E. Arthur Brown Company, 3404 Pamnee Drive, Alexandria, VA, 22304
 Budget Robotics & Computing, PO Box 18616, Tucson, AZ, 85721
 Buyness, P.O. 421773, San Francisco, CA, 94101
 Byte-Back Co., Rt. 3, Box 147, Brodie Rd, Leesville, SC, 29070
 Bytes & Poles, 550 N. 68th St., Wauwatosa, WI, 53213
 C & A Distributors, 4701 W. Linden Road, Kansas City, MO, 64151
 Rod Callahan, Rt. 1, Box 50, Miami, OK, 74354
 Ken Carpenter KCAUG, Box 506, Vernon, AL, 35592
 Chipmunk Software, 634 Littleport Road, Upper Darby, PA, 19082
 Christian Software, Box 547 - St. Rt. 590, Gettysburg, OH, 44135
 Cinagro Software, 155 7th St., Rochester, NY, 14609
 Jim Claffetier, 646 Corwin Ave, Glendale, CA, 91206
 CompuSoft Publishing, Inc., 335 Broadway, El Cajon, CA, 92021
 Computer Continuum, 301 10th Avenue, San Francisco, CA, 94112
 Computer Shopper, PO Box 4, 407 S. Washington Ave., Titusville, FL, 32796
 The Computer Trader, P.O. 20976, San Diego, CA, 92120
 Computer Use Publishing, 92 Ruskin St., Ottawa, Ontario, Canada K1Y 4B2
 Computer Ware Software, P.O. 1059, Riverdale, NY, 10471
 Cottage Technology, 5720 N. Little York, Suite 170, Houston, TX, 77091
 Creative Computing Press, 39 E. Hanover Ave, Morris Plains, NJ, 07950
 Crypt, 303 Meadowlark Lane, Durant, OK, 74701
 Crystal Coast Software, P.O. 233, Hornhead City, NC, 28557
 C-Tech, PO Box 35553 #170, Houston, TX, 77238
 Curry Computer, 5344 W. Lanff, Glendale, AZ, 85306
 C. J. Associates, Department L, 419 N. Johnson St, Ada, OK, 45810
 D&K Industries, 10045 Vanowen Street, H. Hollywood, CA, 91605
 Datacon, PO Box 775, Kernersville, NC, 27284
 Development Associates, 1520 South Lyon Street, Santa Ana, CA, 92705
 Development Engineering Laboratory, 13512 Keating St., Rockville, MD, 20853
 Delphic Enterprises, PO Box 72205, Corpus Christi, TX, 78472
 Jack Deuber Software, PO Box 305, Casselberry, FL, 32707
 Doug Demey, 206 James St, Carboro, NC, 27510
 DHS, P.O. 631, Orlando, CA, 95063
 Dilithium Press, 2205 SW Hibbs, Suite 151, Beaverton, OR, 97005
 Discount Software, 520 E 50th St, New York, NY, 10022
 Doc's Software, 4339 Keysville Ave, Spring Hill, FL, 33526
 Dokay Computer Products, 2100 De La Cruz Blvd., Santa Clara, CA, 95050
 C. Dos-Santos, PO Box 9521, Fountain Valley, CA, 92728
 Down East Computer, PO Box 3096, Greenville, NC, 27634
 Dynamic Designs, PO Box 872, Norco, CA, 91760
 Electronic Technology Today Inc., PO Box 240, Passapequa Park, NY, 11362
 ENER-Z Company, PO Box 635, Fort Washington, PA, 19034
 Executive Workshop, 7420 S. E. Woodstock Blvd, Portland, OR, 97206
 E-Z Key, Suite 75 A, 711 Southern Artery, Quincy, MA, 02169
 Ezra Group II, PO Box 5222, San Diego, CA, 92105
 Farside Creations, 543 Ironwits Trail, Carol Stream, IL, 60188
 Bob Fingerle, 39039 Embarcadero Terr., Fremont, CA, 94536
 Charles T. Fischer, 75 Dunfries Terrace, San Rafael, CA, 94901
 Garyel Frohne, 601 N. Highway 83, Jenseville, IL, 63106
 Games to Learn By, 2 South St., Box 575, Williamsburg, VA, 01096
 Ganhart/EARTHINGS, 115 R. Rocky River Dr. Berea, OH, 44017
 Elaine Gaudes, 1278 Mount Allison University, Jacksonville, N.B., Canada E0A 3C0
 General Systems Consulting, 2312 Rolling Rock Dr, Conley, GA, 30027
 Gesang Associates, PO 452, Randallstown, MD, 21133
 Herman Geschwind, 1714 Claremont Dr, Greensboro, NC, 27410
 Gibson Data Services, 9 Orchard Drive, Durham, NH, 03824
 Gladstone Electronics, 90 Furman Blvd, Buffalo, NY, 14203
 Granada Publishing, 515 Madison Ave, New York, NY, 10022
 The Great Aul. Software Exchange, Dept CS, P.O. 1540, Springfield, VA, 22151
 Wayne Green Books, 60 Pine Street, Peterborough, ON, 03400
 Group Technology LTD, P.O. 67, Clack, WA, 20072
 L. Harmon, 4909 Clearlake Dr, Atafie, LA, 70002
 Hangtild Software, PO Box 7600, Little Rock, AR, 72217
 Heath Computer Services, 950 East 52 Street, Greentown, IN, 46936
 Dave Hebert's Computer Classiflods, PO Box 344, Leola, PA, 17540
 Heller Paper Co., 2123 E 34th St, Brooklyn, NY, 11234
 Hobby Robot Co., P.O. 307, Hazlehurst, GA, 31539
 Home Doctor Software, 1445 Oldfield Road, Decatur, GA, 30030
 Hunter Electronics, 1630 Forest Hills Drive, Okemos, MI, 48864
 Hybrids, 614 Linden Hill, Lindenwald, NJ, 08021
 I. J. S. Enterprises, Box 4503, Lancaster, CA, 93594803
 Independence Research, P.O. 1497, Uren, UT, 84057
 Interdata Data Systems, 11 Brighton Ave, Toronto, Ontario, Canada M6H 1P3
 Interface Innovations Inc., 4372 Casa Brazillia Suite 201, St. Louis, MO, 63129
 JDC Microdivices, 1224 S. Bascom Ave., San Jose, CA, 95126
 JK Audio, PO Box 3295, Escondido, CA, 92025
 J Software, 132 Appleford Street, Gloucester, Ontario, Canada K1J 6H4
 JPR Software, PO Box 4155, Winter Park, FL, 32753
 J. J. Software, John Piccola Coffey, PO Box 444, Scottsburg, IN, 47170
 K. J. Software, P.O. Box 61, Chicago, IL, 60604
 J. C. Kilby Associates, Central Avenue, Peaks Island, ME, 04106
 J. K. Kinnaird, 721 Rosella Ave, Floor 2, Akron, OH, 44307
 Knighted Computers, 707 Highland St., Fulton, NY, 13065
 Arnold Kander, 4 Jone Street, New York, NY, 10014
 K&S Software, 1000 N. Main St., Springfield, IL, 62760
 K-2 Electronics, 3090 Varisty Dr, Ann Arbor, MI, 48104
 John Kuhn, 1707 Tino St., Jacksonville, FL, 32204
 Virginia T. Lake, P.O. 351, Jeckessville, DE, 19709
 L & E Enterprises, PO Box 6364, Silver Spring, MD, 20906-0284
 D. Lipinski Software, 2737 Susquehanna Road, Roslyn, PA, 19001
 Luskon Inc., 24, Inter Street, Warrenton, OR, 97146
 Logic World Software, PO Box 1124, Olympia, WA, 98507
 Lorantha, P.O. 759, Jackson, CA, 93358
 Martel Software, P.O. 2392, Secaucus, NJ, 07094-0992
 Maryland Lock Exchange, 4500 Collier Avenue, College Park, MD, 20740
 Mech. Design Analysis, 1235 Adams Street, Dubuque, IA, 52001
 Micro-Load, PO Box 1095, Truth or Consequences, NM, 87901
 MicroSync, 46 Foundry St., Keene, NH, 03431
 Minnet Software Co., 5222 Harwich Dr., Crestwood, IL, 63126
 Hill Research, 32740 Avalon Crescent, Abbotsford, BC, Canada V2T 3J0
 Robert C. Joler, 5590 Socor Rd., Traverse City, MI, 49684
 Jontuware, PO Box 310, MFL, NJ, 07435
 Jontuware Software, 15 North 7th Avenue, Paeon City, WI, 26159
 R. Jolly, 30 Whitney Ridge, Hamden, CT, 06514
 Melco Pacific, PO Box 792, Emonds, WA, 98020
 Ocean Software Inc., 451055 Transwarp, NJ, 14306
 The John Oliver Co., 1101 Whiskey Dr., Cumberland, IL, 60225
 Orange Coast Software Corp., PO Box 951, Orange City, CA, 92655
 Orion Computers, Rt. 2, Box 310, Louisville, KY, 40277
 Orion's Unit Enterprises, 407 N. Fairway Rd, Glenside, PA, 19036
 Pacific Information Inc., 11604 Ventura Boulevard, Suite 235, Studio City, CA, 91604
 Peck II Productions, 6333 Parkman Pl., Cincinnati, OH, 45213
 Phoenix Enterprises, 1730 N. DuPont Ave., No. 17, Dover, DE, 19901
 Pion Software Co., 543 Fairlawn Avenue, Toronto, Ontario, Canada M6J 1P5
 Pleasantree Programming, PO Box 1345, Hays, AZ, 85203
 Poretsky & Poretsky Inc., 821 Angely, Brooklyn, NY, 11218
 Practical Promises, Inc., PO Box 92104, Milwaukee, WI, 53209
 Krain D. Pritts K2LMO, 3421 Omaha St, Chaddicks, NY, 13319
 Pyramid Electronics, 2174 Gulf Gate Dr, Sarasota, FL, 35951
 Quicksilver Inc., 426 N. Lakona, San Antonio, TX, 78216
 QZX, c/o Alex Burr, R57 2025 O'Donnell Dr, Las Cruces, NM, 88003
 RMI, 4725 N. Milwaukee Ave, Chicago, IL, 60630
 Ramex, 42645 Van Dyke, Utica, NY, 45007
 Red Ballon Software, Pitcher Ecosystems, Inc. B, 17014 Madison Rd., Mand, WA, 99021
 Reshware, 4001 Pennwood, J. Las Vegas, NV, 89102
 R.I.S.T. Inc., PO Box 450, Fort Hamilton Sta., Brooklyn, NY, 11209
 Robotics, 55 C. St., Pointe St. Park, Paryssburg, OH, 43051
 Romal Inc., 1526 Aviation Blvd, Suite 1111, Redondo Beach, CA, 90278
 Russell Electronics, PO Box 539, Contra Costa, CA, 94528
 Howard J. Sams, 4300 N. 62nd St, Indianapolis, IN, 45226
 S & S Company, 340 K Lake St, Addison, IL, 60101
 SCDF, Inc., PO Box 9021, 733 Concord, Richmond, KY, 40475
 Second Base, 700 Lexington Avenue, Algonza, PA, 16001
 Paul F. Seymour, P.E., PO Box 11, Haddon, NJ, 07415
 Sharps, 127 Hinefile Rd., Sandston, VA, 23150
 Sheridan House Inc., 146 Palisade Street, Johns Ferry, NY, 10522
 Edgar Sigorski, PO Box 442, Susquehanna, PA, 1 A7
 Sinclair Research Ltd., 50 Stanfield Street, Boston, MA, 02114
 Simplex Software, P.O. Box 792, Le. Runswick, ID, 65003
 Sinclair, PO Box 23-2, La Jolla, CA, 92037
 Sinclur Inc., PO Box 523, Joplin, MO, 64501
 Simore, PO Box 1032, Santa Fe, NM, 87505
 Skirluore, a Turning Hill Road, Lexington, MA, 02173
 Skinner Electronics, PO Box 777, Fallbrook, CA, 92028
 Skynline Software, 110 Independence Ave. SE, Washington, DC, 20003
 Xendric Smith, 127 Hears Ct, Stanford, CA, 94305
 Softbytes, PO Box 119, Ayville, NY, 14727
 Soft Logic Corporation, 1211 N. 11th Street, Bryan, TX, 77805
 Software Associates, 151 W. 10th St, Toronto, Ontario, Canada M5T 2C7
 Softmark Associates, 211 Fifth Avenue, New York, NY, 10010
 Softsync Inc, 14 F. 11th St, New York, NY, 10010
 Softnet Solutions, 127 Hears Court, Stanford, CA, 94305
 Softnet, 320 N. Broadway, Dept 12, San Francisco, CA, 94102
 Sourceware, PO Box 107, Dept 11, Miami, FL, 33107
 Sourceware, PO Box 1112, Joplin, MO, 64501
 David Spillman, PO Box 223, Provo, UT, 84603
 Starliner Software Systems, Inc, 10000000 Circle, Sacramento, CA, 95831
 Story Software, 33 S. 7th Street, Okemos, MI, 48864
 Sturdivant Laboratories, Box 110, Oshkosh, WI, 54901
 Sum-ero, 10000000 Circle, Okemos, MI, 48864
 Sunset Electronics, 2254 Terminal, San Francisco, CA, 94116
 Sybex Computer Books, 2304 Sixth Street, Berkeley, CA, 94710
 Sync-abstracts, PO Box 313, Joplin, MO, 64501
 Syncrex Inc, PO Box 64, Jefferson, NJ, 08535
 Syncrex, The Harvard Group, Rt. 2, Box 27, New York, NY, 01451
 T. J. Software, 100 N. 11th St, Joplin, MO, 64501
 Tapecon Inc., 45 Jefferson St., Stamford, CT, 06902
 Technology Products and Services Inc., PO Box 230, East Plain Beach, FL, 33402-1230
 T-J Computer Products, 659 N. Virgil Ave, Los Angeles, CA, 90029
 C. Vernon Tidwell, P.E., 1303 Winterset St., Key West, FL, 33040
 Time Teigns Magazine, 29722 Hult Road, Colton, CA, 95017
 Timensa Software, 3707 Downey Dale Dr, Randallstown, MD, 21133
 Timelines, PO Box 1312, Pacifica, CA, 94044
 Toco Technology, P.O. Box 50, Santa Claus, IL, 47579
 Toronto Software World, PO Box 34, Ancourt, Ontario, Canada M1S 3B4
 Triangle Sinclair User Group, John Wemy, 200 James St, Carboro, NC, 27510
 T-S Horizons, 2002 Summit St, Portsmouth, NH, 05862
 T.S. Services, PO Box 15214, Red Bank, TX, 37415
 TSW, c/o Dunliss Demey, 200 James St, Carboro, NC, 27510
 21st Century Electronics, 4013 Park Street, Guttentberg, NJ, 07093
 2-816 Software, PO Box 20306, Dul har, CA, 92014
 UMS, PO Box 612, Haddonfield, NJ, 08033
 Val Corporation, 1071 N. Wakefield Street, Arlington, VA, 22207
 Votrax Inc., 1394 Rankin, Troy, NJ, 48063
 Harvey Wasserman, 4604 Apple Tree Dr, Alexandria, VA, 22310
 White, 308 10 1/2 Avenue S., Rochester, NY, 50002
 White Lighting, Rt. 4, Box 2240, Lufkin, TX, 75901
 W. Software, PO Box 5223, Roanoke, VA, 24012
 Wajup Co., 1120 Merrifield St, Grand Rapids, MI, 49507
 Wizard Works, PO Box 65, Millerville, NJ, 08063
 W3 Data Systems & Software, 11000 N. Main St, Joplin, MO, 64501
 Tom Woods, PO Box 44, Jefferson, NJ, 08503
 Zebra Systems Inc., 75-06 Jamaica Ave, Moonaucho, NY, 11421
 ZI-Pending, Ltd., PO Box 25, Newton, CA, 94544

NOTE: * Designates that those suppliers are listed in the DLS Buyers Guide and we have written confirmation that they are still going to support the Times and Sinclair computers. The remain have advertised or have had their name mentioned in a publication as still supporting the computer. We also know of over 300 other possible suppliers, but we have not been able to confirm that they are still supporting the computers. We hope to have this information for the update of the guide.

D. LIPINSKI SOFTWARE BUYERS GUIDE TO SINCLAIR TIMES PRODUCTS & SERVICES is now available. 120

D. LIPINSKI SOFTWARE
 2737 Susquehanna Road
 Roslyn, PA, 19001 USA

LETTERS TO LIST

Wes Brzozowski
337 Janice St.
Endicott, NY 13760
March 10, 1985

Harold Farb, Who are you?

Mr. Pashtoon,

This is just a little note to tell you that I've appreciated your articles in the L.I.S.T. newsletter and in SYNTAX. The latest L.I.S.T. newsletter suggests that John Oligier "look you to task" because of the microdrive interfacing techniques you've used. I hope this will not discourage you from continuing the work you've been doing. It's very helpful and very important.

Although I agree with some of the points Mister Oligier seems to have made, it's far more significant that you've achieved success. Because of that success, others will be encouraged to spend the not insignificant amount of money needed to try for themselves. I've designed & built my own interface, for example, but would never have tried except for the kind of news you presented in your articles. (It's all very nice to be a pioneer, but I personally needed some assurance that the problem could be solved before I'd shell out 125 bucks.) After I did get started, the L.I.S.T. newsletters with your articles were never far away; they were highly valuable in getting my design to work.

Looking at the "big picture", I'm sure that your articles will have catalyzed a cycle of design projects from which more and more versatile microdrive interfaces will evolve. I have hopes that my design might be the next step, (but by no means the last!) but for now, we'll just have to wait and see. My write up will appear in the Arch Sincus News, which your group receives from us. If you've got a spare moment to look it over, I'd be very pleased to hear your comments or suggestions. In any case, I hope it might be of some use to you, after all the help you've unknowingly given me.

Thanks so much & keep up the good work!

Sincerely,

Wes Brzozowski
Wes Brzozowski

This is not that funny. Please refrain from this type of activity.

PCWORLD INVOICE DATE- 02/11/85
P.O. Box 6700 Bergenfield, New Jersey 07621

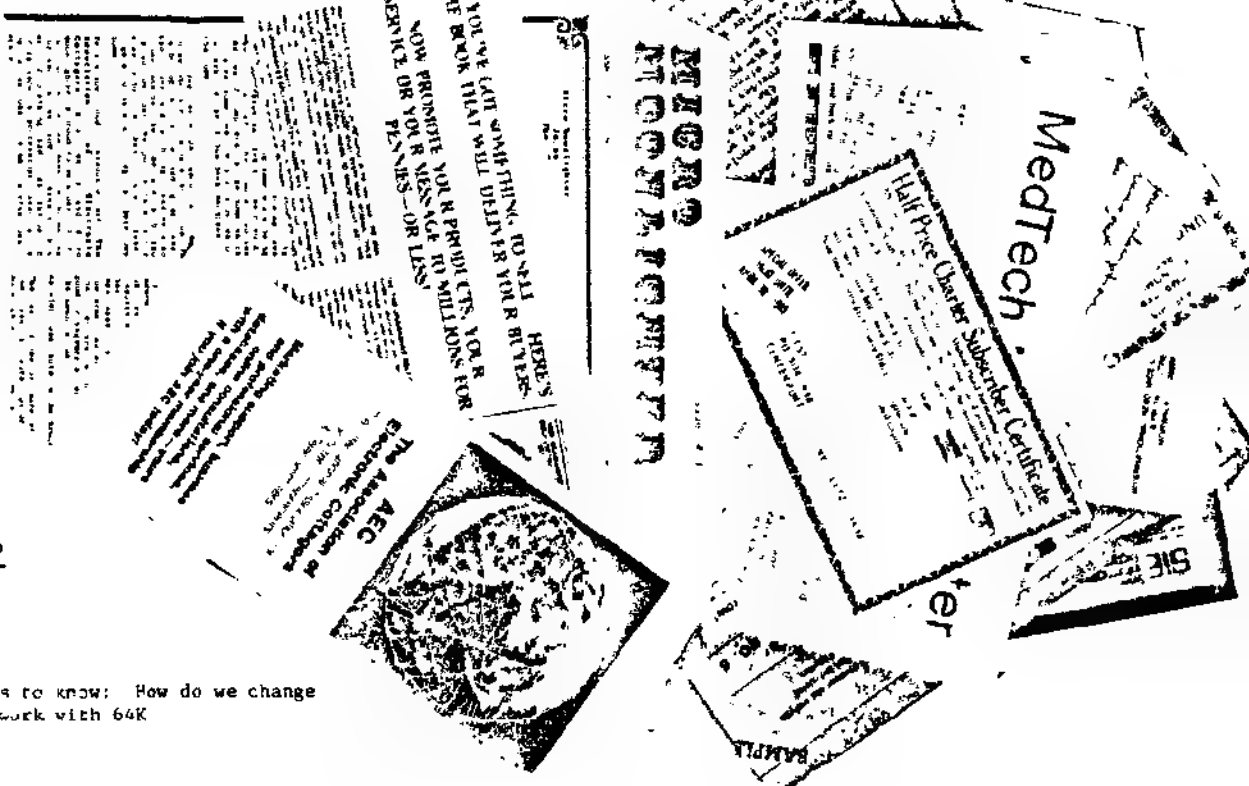
SUBSCRIPTION INVOICE

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Please return this statement with your payment. Make checks payable to PCW World. Thank you.

We get all kinds of mail.



Ed Wheeler needs to know: How do we change "organizer" to work with 64K

K. Siewnenhoff - as far as I know, Memotech is still in business

Vincent Yurgen is trying to drive a Selectra from his ZX81. If anybody bought the adaptor kit?

Paul J. Donnelly
1151 West Group
PO Box 439
Centerport, NY
11721-0439

Timothy R. Russell
912 Kingsway Circle
Thousand Oaks, CA
91320

DECEMBER 15 1986

CENTERPORT NY 11721

DEAR MR. DONNELLY:

THANK YOU FOR INCLUDING ME IN YOUR SOFTWARE SIGNATURE PROGRAM. I THINK IT IS AN EXCELLENT IDEA FOR COMMUNICATION AMONGST THE MEMBERS.

I DO NOT HAVE, NOR DO I INTEND TO PURCHASE A T2868, MY MAIN SYSTEM HERE IS A T2868, AND I WOULD VERY MUCH LIKE TO RECEIVE Z801 OR T2868 TAPES ONLY.

THE PROGRAM THAT I HAVE CHOSEN TO SUBMIT IS A MODIFICATION TO AN INTERESTING ONE THAT WAS PUBLISHED IN SYNTAX FOR THE Z800 COMPUTER. I ENJOYED IT SO MUCH THAT I CONVERTED IT TO RUN ON A Z801 OR T2868. I HOPE YOU AND THE OTHER MEMBERS FIND IT HELPFUL.

BY THE WAY, THERE ARE TWO ERRORS IN THE "BYTE MOVIE" PROGRAM. LINE 58 SHOULD READ: CHR\$(128+CHR\$(32+CHR\$(128)), LINE 64 SHOULD READ: CHR\$(128+CHR\$(32+CHR\$(128))).

IF YOU CAN SPARE A FEW MOMENTS TO DROP ME A LINE AND EXPLAIN WHY MY LAST COPY OF LIST HAD BROWN PAPER CLIPED ALL OVER IT, I WOULD GREATLY APPRECIATE IT. ALSO, YOU MIGHT ADVISE ME IF YOU OR ANY ONE ELSE IN THE CLUB IS KNOWLEDGEABLE ABOUT Z80 MACHINE CODE AS IT RELATES TO THE Z801 OR T2868. I HAVE AN EXCELLENT PROGRAM WHICH I AM UNABLE TO GET WORKING CORRECTLY BECAUSE OF AN ERROR OR ERRORS IN THE MC KEYBOARD INPUT CODE. AND I WOULD APPRECIATE ANY HELP THAT YOU OR YOUR MEMBERS CAN OFFER. THANK YOU.

SINCERELY,

JOHN A. SAMPSON
23-51 123 STREET
COLLEGE POINT NY 11356

3-7-85

Dear LIST:

I've read that some of your group members have successfully dealt with British firms. I understand that they will take Visa or MC. Can you recommend one or two and a British Sinclair User's group? Are any of the British firms discounters or wholesalers?

The reason I'm inquiring is due to the article in Nov. 84 Byte p.415 on the PSION ORGANISER. It may be possible to use this as an Atari programmer for T2868 cartridges. They have (PSION has) a USA distributor and a nice brochure: PSION INC.
40 Lindenman DR.
(203)371-4371 Trumbull, CT 06611

Their prices here are quite a bit higher than in the Byte article. You're probably aware that Psion wrote the software for the QL.

Thanks for the help. Sincerely yours,
Chuck Trier

Spokane, WA 99215

Dear Paul,

I read your note in the latest Synchro News concerning a possible 15-2068 to ZA-Spectrum Bus conversion standard with a great deal of interest. The subject has been on my mind as well and I have some general comments on the subject, as well as a description of the converter that I have built. It is, as yet, not fully tested, but I will keep you posted on the results. In fact, the 2068 signals have identical, or unmodified but otherwise identical, counterparts on the Spectrum bus. Direct wiring is possible here, either with or without additional buffering. In addition, the following signals have no Spectrum counterparts, and may be left unconnected: SPKR/TAPE, EAR, A7RB, DZ IN, DZ OUT, EXROM-NOT, ROMCS-NOT, BUS 150, IORS, and SOUND.

There is only one Spectrum signal which has no counterpart on the 2068. This is the 10808E-NOT signal, which is used in the Spectrum for fully decoding the lower 128 I/O ports, which is already done internally in the 2068. Therefore, 10808E-NOT can also be left unconnected.

I do not believe that there should be too much concern about the video signals normally present on the Spectrum bus, as any video interfacing should really be done before the bus conversion. In the interest of some conformity, however, I suggest that the R-6-B signals be provided at the Spectrum pins that normally carry the V-1-U signals. My connections for these signals on my prototype were made using miniature coaxial cable, as was the connection for the composite VIDEO signal.

The most important decision for a standard conversion is that concerning the Spectrum's ROMCS-NOT signal. This signal can be

tested for the 2068 by inverting ROMCS-NOT, and driving it with

address lines A16 and A15. The resulting signal should be applied

to R-6-NOT. This will turn off the 2068's internal memories whenever

ROMCS-NOT is pulled high, and A16 and A15 are low.

Most peripheral devices create their own voltage supplies,

either from a separate input entirely, or from the main voltage

on the bus. For the Spectrum, the main voltage is +5VDC. The 2068

on the other hand, supplies +15VDC on the bus. Rather than simply

connecting the +5VDC directly to the +15VDC pin on the Spectrum

bus (and maybe risk blowing up an internal circuit on some periph-

eral device), I chose to use a voltage regulator that is capable

of dissipating a fair amount of power. An LM317T with a good heat

sink is capable of supplying the required voltage at well over an

ampere current drain. The other voltages present on the Spectrum

bus are really just bias supplies, not capable of supplying much

current at all, and I recreated these more just for accuracy than

out of any expected use. Of course, note however, is the -12VDC

supply which is not actually present on the Spectrum bus at all.

In real life, the pin marked "-12VDC" is connected to the unreg-

ulated and unregulated 12V from the circuit which provides the

+12VDC.

My voltage converter circuits were designed to be as simple as

possible and yet still work. Both negative voltages are derived

from an oscillator/rectifier circuit, with a center regulator for

+12VDC and an L regulator for the -5VDC. The +12VDC uses only

a center regulator down from the +15VDC.

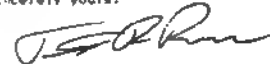
Although not yet fully tested, I believe that this converter

will provide any Spectrum peripheral with all the necessary

signals. Any comments or notes from your user group would be

highly appreciated.

Sincerely yours,



P.S. I have made a late change in the decoding for ROMCS. I am including the MREQB signal in the OR-ing configuration, for a better, more complete decode. You'll see this from the schematic.

We've received a complete brochure on their course, contact Paul D. if you're interested.

Campbell Center

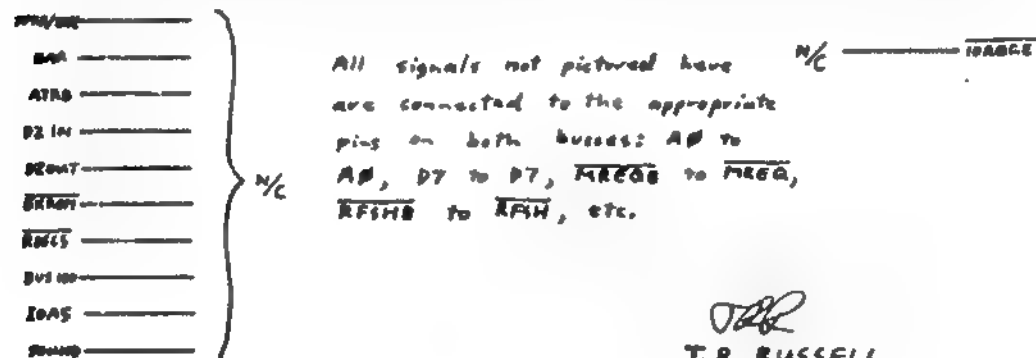
For Historic Preservation Studies
Mount Carroll, IL 61053
P.O. Box 66 815-344-1173



Continued:
I know that your users' group is small, but I also know that Sinclair-User users often delight in modifying and improving their equipment to do what they want. Let me tell you, the main field needs ROMCS.
We are short, critically short, of people who can apply computers to museums. That is the reason we offer classes to museum and computer professionals. The last source for help to museums, particularly small ones, is the Sinclair-User group. That is what made me think about the "Sinclair-User" group.
I haven't put anything in the middle about Sinclair-User. But I would be very pleased if some of your members attended. Please include information about the course and the opportunity it represents, in your next newsletter.

Sincerely,
Timothy R. Russell
1-1212 Director

List
Group



All signals not pictured have
are connected to the appropriate
pins on both buses: A0 to
A0, D7 to D7, MEM0 to MEM0,
RFSH0 to RFSH, etc.

T. R. RUSSELL
03/01/1985

T/S
2068

EX SPECTRUM

EX #1;
T/S
1000

B (DATA)	A (ADD)
5V	D7
9V	RAMES
SLOT →	
0V	D0
0V	D1
0	D2
A0	D6
A1	D5
A2	D3
A3	D4
A15	INT
A14	NMI
A13	HALT
A12	FREE
A11	IOAB
A10	RD
A9	WR
A8	BUSAK
A7	WAIT
A6	BUSAQ
A5	RESET
A4	MI
RAMES	RFSH

B
(DATA)

A
(ADD)

0V	0V
SPRA/DRK	EAR
+15V	A7RB
+5V	D7
()	(D2IN)
SLOT →	
0V	D0
0V	D1
0	D2
A0	D6
A1	D5
A2	D3
A3	D4
A15B	INT
A14B	NMI
A13B	HALT
A12	FREEB
A11	IOAB
A10	RD
A9	WR
A8	BUSAK
A7	WAIT
A6	BUSAQ
A5	RESET
A4	MI
(D2OUT)	AFINE
RED	EXROM
GREEN	RACES
BLUE	BE
(BUS150)	IOAS
VIDEO	SOUND
0V	0V

B
(DATA)

A
(ADD)

A14	A15
A12	A13
5V	D7
9V	()
SLOT →	
0V	D0
0V	D1
0	D2
A0	D6
A1	D5
A2	D3
A3	D4
IOAB	INT
0V	NMI
VIDEO	HALT
Y	FREE
V	IOAB
U	RD
BUSAK	WR
RESET	-5V
A7	WAIT
A6	IOV
A5	UNREG. IOV
A4	FT
RAMES	RFSH
BUSAK	AT
A9	A10
A11	()

'A' side is
Component Side
'B' Side is solid
side (bottom)

Signals shown in parentheses have no actual connections within the computer.

T. RUSSELL
02/28/85

OK

Technical Report:

COOLING YOUR ZX 81/TS 1000

If you are looking for high reliability with continuous operation of your ZX 81/TS 1000, then this article may be for you.

POWER SUPPLY

Many articles appearing in various Timex/Sinclair related publications during the past few years have stated that within the "black box" there was excessive heat build-up, which eventually would lead to computer failure. Some of the remedies spelled out were to cut slots or drill holes in the top and bottom of the case to allow circulation of air to aid in cooling. Others suggested increasing the size (mass) of the voltage regulator heat sink to cool down the 5 volt regulator.

There is nothing wrong with any of the above ideas, however, instead of cooling the regulator and allowing the heat to escape from the computer case, why not remove the source of the heat in the first place! All it takes is removal of the 7805 voltage regulator IC and in its place use an external power supply for your computer and ram pack.

Radio Shack is currently selling a switching power supply capable of supplying +5 VDC at 1.1 amps, +12 VDC at 400 ma and -5 VDC at 200 ma. The T/S computer section and 16K ram pack require +5 VDC and the 16K ram pack additionally requires +9 VDC to +12 VDC for the ram pack 4116 ram chips. Within the 16K ram pack is a small switching supply which provides -5 VDC, also for the ram chips and if this supply gives out (as it does quite frequently), then the -5 Volt output from this external power supply can be used.

The Radio Shack Switching Power Supply, #277-106, sells for \$4.95 and requires an external transformer capable of providing 18 VAC at several amps. RS #273-1515 is the recommended transformer and costs \$6.99.

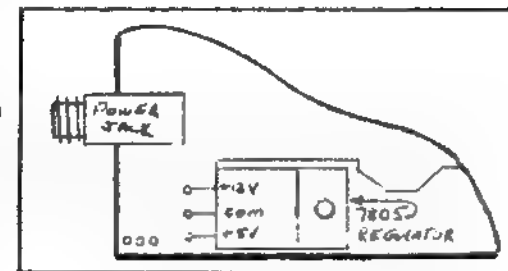
NOTE: Switching power supplies are the state-of-the-art for all modern computers and monitors. They are light weight and efficient. All components within the supply operate on the cool side and provide extremely reliable operation over long operating periods. The only objection to switching power supplies is that they emit a high frequency note as they oscillate. If the supply is cased, you will not hear it 'sing'.

For those of you that like to 'roll your own', I have provided a simple power supply circuit at the end of this article. I have used this circuit for my ZX 81 for well over two years and it never let me down. Several power supply circuits have appeared in previous issues of L.I.S.T., which can be adapted for your requirements.

The components stated in the parts list will provide you with more than adequate current output for the basic ZX 81 / TS 1000 with a 16K ram pack. You can, if you wish, use the 7805, 5 volt regulator when it is removed from your computer in place of the LM 323K regulator called out in the parts list. Bolt the regulator firmly to the metal case of the supply and use a heat dissipating compound between the regulator and the metal case.

If you decide to use an external power supply, unbolt the regulator mounting screw and carefully bend up the regulator leads. Desolder the regulator from the assembly and then clear each of the plated through vacated holes of solder. Prepare three eight inch lengths of #20 insulated wire by removing 1/4 inch of insulation from each wire end and tinning the bare wire ends. Insert the wires into the plated through holes on the computer board which the voltage regulator previously occupied and solder them in place. Rout the wires through the back end of the power supply jack (or remove the jack if you wish) and solder a male, multi pin connector to the bare ends of the three wires. A suitable connector set can be purchased at Radio Shack; male, 4 pin #274-224; female, 4 pin #274-234, at \$1.09 each. The female connector will be connected to the external power supply cable.

The 12 VDC lead is soldered to the inside plated through hole; the common (ground) lead is soldered to the center hole and the 5 VDC lead is soldered to the hole at the edge of the PC board. It would be a good idea if each wire was of a different color or you can place a piece of tape around each of the wires for voltage identification.



COMPONENT GENERATED HEAT

A second source of heat comes from the ULA, IC-1. The ULA from my ZX 81 operated very hot - it self-destructed and a replacement had to be obtained from Sinclair Research, Ltd.

I contacted AAVID Engineering, Inc; 30 Cook Court, Laconia, NH 03246 and requested a sample of of their 40 pin IC clip on heat sink. Sorry, I don't have the part stock number. If you request a sample, please use business stationary for your request. You may also ask for the name of their nearest dealer selling the AAVID line of heat sinks in the event that AAVID will no longer provide a sample.

Calendar:

March 29 New York City Personal Computer Show and Sale - Age 30th & 31st - Madison Square Garden (212) 297-2526

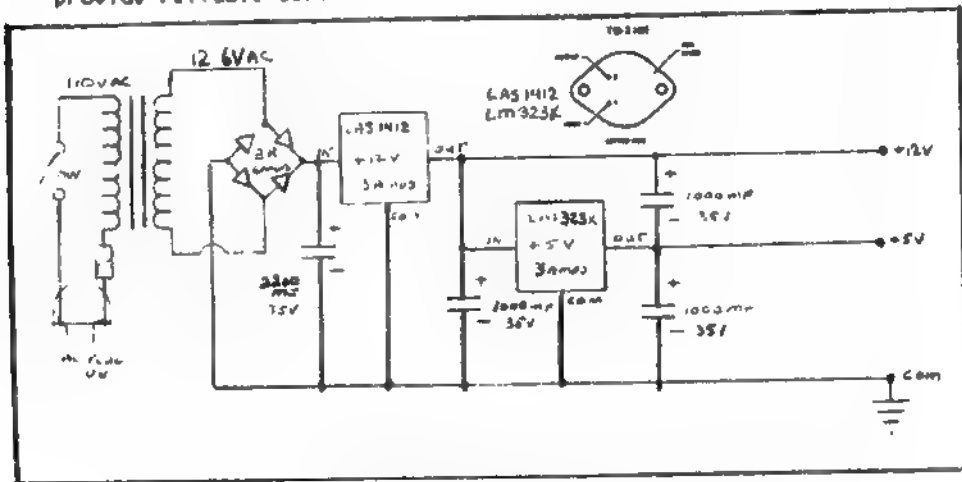
April 20, 21 - Trenton Computer Festival (10th Annual) - Trenton State College, Trenton, N.J. (609) 771-2487

List
Group

4/85

Installing the heat sink is a cinch. Carefully pry up the ULA a little at a time on both ends using a small screwdriver. Please use the usual CMOS IC handling precautions to prevent damage to the IC from static discharge. Slide the heat sink over and under the IC (the ULA sits between two sections of the heat sink) and then push down on the heat sink/IC assembly to insure that the IC is seated properly in its socket. Examine the area around the heat sink to insure that any bare resistor or capacitor leads are not in contact with it. If necessary the aluminum fins on the heat sink can be bent upwards to correct any problem associated with component shorting.

You will find that the ULA now operates very cool and will provide reliable service for the life of your computer.



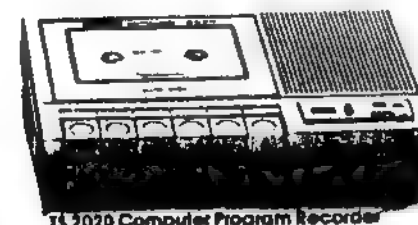
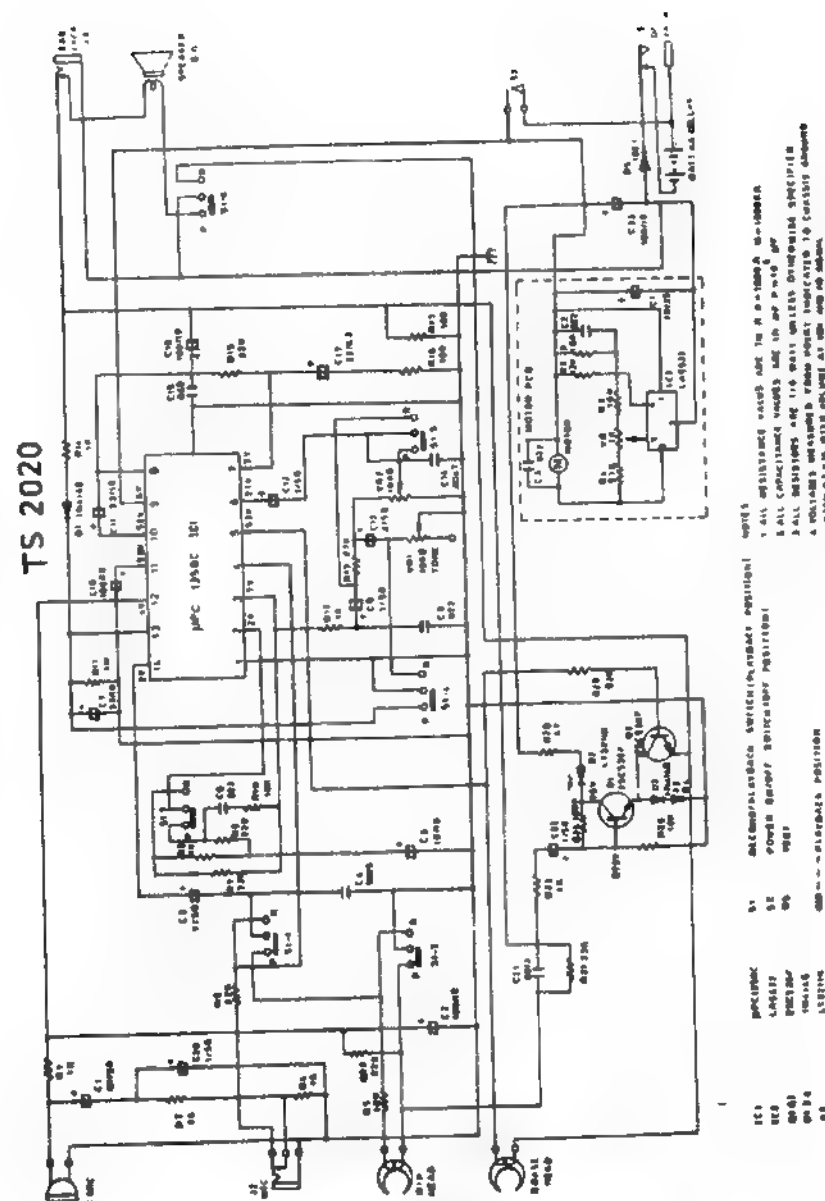
POWER SUPPLY SCHEMATIC

LAS 1412 +12 Volt, 3 Amp TO 3 voltage regulator \$3.50
 LM 323K + 5 Volt, 3 Amp TO 3 voltage regulator \$3.50
 B.G. Micro, PO Box 280298, Dallas, TX 75228 214-271-5546
 12.6 VAC transformer at 3 amps #273-1511 \$5.99
 Bridge rectifier at 6 Amps #276-1180 \$2.19
 2200 Mf capacitor at 35 volts #272-1020 \$2.49
 1000 Mf capacitor at 35 volts #272-1019 \$1.59
 Your local Radio Shack
 A line cord, switch of your choice, a 3 amp fuse, a metal case to house the project can also be purchased at Radio Shack.

I realize that building or buying an external power supply can appear to be extravagant for a computer which may have cost as little as \$29.95. However, I am forever grateful to the ZX 80 and the ZX 81 for introducing me to the world of home computing, which has provided me with computing knowledge and the ability and confidence to use this knowledge in business. I could never have had such a computer education for so little cash outlay. The extra cost for a power supply should be considered as an investment towards your computing future.

.....Bob Gilder

SCHEMATIC DIAGRAM



TS 2020 Computer Program Recorder

A CROSS-CORRELATION OF THE SPECTRUM ROM VERSUS TS2068

Part 4

Copy Right ©, Aug. 1984. By N.A. Pashtoon

As promised last month, a short routine for copying the contents of EXROM to RAM will be presented. The routine bank switches to the EXROM bank. This is achieved by outputting the EXROM chunk number (i.e. 01) to the Horizontal Select Register, HSR. The selection of the EXROM bank is also contingent on having bit 7 of port FF set. In order not to disturb the video modes, we first read-in the "status" of port FF into A register by an IN instruction, SET bit 7, and output to port FF. Now we are in the EXROM bank. We do a LDIR for the 8192 bytes of EXROM content to RAM location starting at 32768. Now we reverse the bank switching process, described above, and go back to Home ROM and return. The routine is as follows:

```
DI                      LD BC,2000
LD A,01                 LDIR
OUT (F4),A              XOR A
IN A,(FF)                OUT (FF),A
SET 7,A                  OUT (F4),A
OUT (FF),A               EI
LD HL,0000               RET
LD DE,8000
```

Finally, this installment of the ROM Atlas is the last in the series. I also have an alphabetical and functionally classified cross reference from the TS2068 to Spectrum, similiar to Appendix A in the TS2068 Technical Manual. This type of cross reference is of course less useful than the ROM Atlas in this series, without a fully annotated disassembly of the TS2068. Still, if there is demand from LIST readership, we will publish the alphabetically arranged cross reference also. Lastly, I am hoping that the Atlas has eased the Spectrum software conversion process and helped MC programmers in fully utilizing their TS2068s.

ROM ATLAS

COPY RIGHT N.A. PASHTOON, © AUG. 1984

SPECTRUM		TS 2068		SPECTRUM		TS 2068	
LABEL, NAME	ROM Addr	LABEL, NAME	ROM Addr	LABEL, NAME	ROM Addr	LABEL, NAME	ROM Addr
perk	344C 385B	SA-BYTES	04C2 0066	SA-BYTES	04C2 0066	W-TAPE	
usr no	34B1 3972	SA-LEADER	04D8 007E	SA-LEADER	04D8 007E		
SP-S	34BC 3907	SA-LOOP	04FE 0034	SA-LOOP	04FE 0034		
TEST-ZERO	34E9 3904	SA-BIT-2	0511 00B7	SA-BIT-2	0511 00B7		
GREATER-0	34F9 3914	SA-8-BITS	0525 00CB	SA-8-BITS	0525 00CB		
NOT	3501 391C	SA/LO-RET	053F 00F5	SA/LO-RET	053F 00F5	W-BORO	
loss-0	3506 3921	REPORT-0	0552 00F9	REPORT-0	0552 00F9		
FP-0/1	350B 3926	LD-BYTES	0556 00FC	LD-BYTES	0556 00FC	R-TAPE	
or	351B 3936	LD-BREAK	056B 0111	LD-BREAK	056B 0111		
no-&no	3524 393F	LD-LEADER	0550 0126	LD-LEADER	0550 0126		
str-&no	3520 3948	LD-SYNC	058F 0135	LD-SYNC	058F 0135		
no-1-eql	353B 3956	LD-8-BITS	05CA 0170	LD-8-BITS	05CA 0170		
str-add	359C 3907	LD-EDGE-2	05E3 0189	LD-EDGE-2	05E3 0189	RD-BIT	
STK-PNTRS	35BF 390D	LD-EDGE-1	05F7 016D	LD-EDGE-1	05F7 016D	RD-LOGI	
chrS	35C9 39E4	LD-SAMPLE	05ED 0193	LD-SAMPLE	05ED 0193		
val-&valS	35DF 39F9	SAVE-ETC	0605 01AB	SAVE-ETC	0605 01AB	SLVN	
strS	361F 3A3A	REPORT-F	0642 0278	REPORT-F	0642 0278		
read-in	3645 3A60	SA-NAME	064B 0231	SA-NAME	064B 0231		
code	3669 3A54	SA-DATA	0652 0238	SA-DATA	0652 0238		
len	3674 3A5F	SA-V-OLD	0672 029A	SA-V-OLD	0672 029A		
der-jr nz	367A 3A95	SA-V-NEW	0685 02A9	SA-V-NEW	0685 02A9		
JUMP	3686 3A41	SA-SCRS	06A0 02C7	SA-SCRS	06A0 02C7		
jump-true	369F 3A46	SA-CODE	06C3 032E	SA-CODE	06C3 032E		
end-calc	369B 3A36	SA-LINE	0716 0447	SA-LINE	0716 0447		
n-mod-n	36A0 3A8B	SA-ALL	075A 04C9	SA-ALL	075A 04C9		
***	36C5 3A55	LD-LOOK-H	0767 04DC	LD-LOOK-H	0767 04DC		
Int	36AF 3ACA	LD-NAME	0746 053D	LD-NAME	0746 053D	VERIFY	
Exp	36C4 3A0E	VR-CONTROL	07CB 059F	VR-CONTROL	07CB 059F		
in	3713 3B2F	LD-BLOCK	0902 05C6	LD-BLOCK	0902 05C6	LOAD	
get-argt	3793 3B9E	LD-CONTROL	0909 05CC	LD-CONTROL	0909 05CC		
cos	37AA 3BC5	LD-DATA	082E 0606	LD-DATA	082E 0606	MERGE	
sin	3785 3BDD	LD-PRG	0973 0673	LD-PRG	0973 0673		
tan	37DA 3BF5	NE-CONTROL	0986 06L5	NE-CONTROL	0986 06L5		
atan	37E2 3BFD	HE-OLD VP	09F9 0752	HE-OLD VP	09F9 0752		
asn	3833 3C4F	HE-ENTER	092C 0799	HE-ENTER	092C 0799		
acs	3843 3C5E	HE-ENT-1	091E 07CF	HE-ENT-1	091E 07CF		
sqc	384A 3C65	HE-ENT-3	0958 0825	HE-ENT-3	0958 0825	SAVE	
to-power	3851 3C6C	SA-CONTROL	0970 0951	SA-CONTROL	0970 0951		
***	3859 3C89	SA-J-SEC	0991 0894	SA-J-SEC	0991 0894		
(note:SEPRM1 arc tape msgs.)							
'spare'	356E 3C0C						
charctr-set	3D00 3D00						

The balance of EXROM contains the Function Disptenr, Bank Switching Code, and various other routines, which uses not have counterparts in the Spectrum. A total of approximately 2k Bytes of EXROM is unused.

The Spectrum does not support the following routines:
 *** 17B5 AR0S
 *** 17CF GETVL
 *** 17FA VR-EN
 *** 17F1 VR-RX4
 *** 18C VMDOS

2040 TIPS

(*)(&)(*)(&)(*)(&)(*)(&)(*)(&)(*)(&)(*)

Got a nice program listing with a tear in it? or maybe something you want to add to your scrap-book? Thinking about taping it with cellophane? Well don't tape over any of the printing. It seems that the tape will fade the printing in no time. So watch it.

Try this.... TS 2068

```

2 LET Q=160
3 LET W=30
10 LET C=PEEK 23606+256+PEEK 2
3607+256
15 FOR J=32 TO 58
20 FOR K=0 TO 7
25 LET B=PEEK (C+K+J*8)
35 FOR I=1 TO 8
40 LET X=INT (B/2): LET bit=B-
2*X: LET B=X
45 IF NOT bit THEN CIRCLE U-I+
2,0-K*3,1
50 NEXT I: NEXT K: REM PRINT
: NEXT J
54 LET Q=Q-20
55 IF Q<130 THEN LET U=U+16: L
ET Q=160
65 NEXT J: STOP
    
```

THE FORUM.

I ran into something I thought was strange. Try this:

```

10 LET as="sample string"
20 SAVE "sample" DATA as:
RUN (then rewind the tape)
NEW
10 LOAD " " DATA as:
20 PRINT as
30 PRINT as:
    
```

This does not work! For some reason, if you SAVE a string using the DATA token, the string is saved and then can be loaded back into the computer, but not in a form that can be used. There is a simple patch that solves this problem by putting the string into a one dimension-
al array:

```

20 DIM ts(LEN as)
30 FOR i=1 TO LEN as
40 LET ts(i)=as:
50 NEXT i
    
```

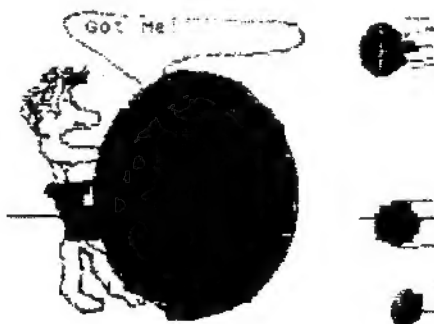
If you SAVE ts, when you LOAD it back in, it can be used as a normal string. Do not ask me why

From Bob Dyl (EMC)

```

10 FOR N = 1 TO 10
20 FORMAT "m"; i; "TEST"
30 NEXT N
40 CAT I
    
```

This will "stretch" your m-drive cartridge tape and often increase capacity by 5 or 6K.



AND NOW IT'S TIME FOR THAT
KEYBOARD WIZARD
PROFESSOR A. 'RAY' DIHM

Professor

How can I tell how much memory I've used up? I got this program I've been working on my ZX81 and by the time I type it all in, my ZX81 starts acting a little senile.

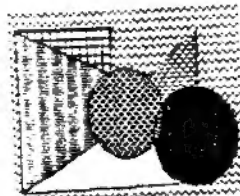
Al S. Hymer

OK Al, just write this down (I know you have a lousy memory)
PRINT PEEK 16396+256+PEEK16397-16509
This will tell you the number of bytes you've used for the program, system variables, and display.
If you have a 2068, just use the FREE key.

Just
For
Herbert.

Switchboard

CATS



T/S 2068 Keyboard Scanning

Most programs require user interaction through the keyboard, and use the INPUT or INKEY\$ functions to do this job. This article will discuss some alternative ways to input through the keyboard.

Method #1: Hardware generated interrupts are used in the 2068 to update the TV frames counter and to scan the keyboard for pressed keys. If a pressed key is found, the character code associated with it is determined and stored in system variable LAST-K. If you POKE a zero in 23560, and then immediately PEEK the same location, the PEEK will return the code for a key pressed between the POKE and PEEK, provided that a scan has occurred in this time interval. To insure a scan, place a USR 737 after the POKE. This method is roughly like an INKEY\$ function which returns a code rather than a string variable.

Method #2: If you are willing to use a small amount of machine code, you can directly call the ROM routine which examines the keyboard. This is K-Scan, located at 688d. (In the Spectrum, this same routine is at 028E (hex).) To use K-Scan, you need to know the position code system used in the T/S, and you need to be able to get at the D and E registers, which is where the position codes are located when a return is made from K-Scan to the calling routine. If no key is pressed, D and E hold 255; one key results in 255 in D and the position code in E; two keys results in position codes in both D and E. The position code is a value from 0 to 39, calculated as follows: $(47 - \text{row}) - (8 * \text{column})$. Here, a "row" means 5 keys in a half-row, such as A S D F G. Rows are numbered 1 to 8, starting with the lower left row and going up and then down. A "column" consists of 8 keys, such as column 2: Z S W 2 9 O L Break/Space. There are 5 columns, numbered 1 thru 5, starting with the outer keys. (Note that there are two redundant keys which are ignored; these are the space-bar and the right side cap shift; these are keys added by Timex which perform no new function but make the keyboard a bit more like a typewriter.) Unlike method #1 or INKEY\$, method #2 allows you to handle two keys pressed at the same time.

Method #3: This method uses the IN function. For example, the BASIC statement LET A = IN 65278 will scan the 1st row (bottom, left, 5 keys) and assign to A a value of 31 if no keys are pressed. (Note: Some published programs using IN are for the Spectrum version 2, whose base value is 255, not 31.) If the keys are pressed the value returned is the base value (31) minus the column value of any key pressed. Column values are 1, 2, 4, 8, and 16 for columns 1, 2, 3, 4, and 5 respectively. The number following IN must meet certain criteria. When expressed as a two byte binary number, the least significant ("low") byte must be the port number of the keyboard (i.e. 254 decimal). The most significant ("high") byte must have a "0" in the bit position corresponding to the row to be scanned. In the above example, 65278 in binary has as its high byte 11111110; since the zero is in the 1st bit position, the 1st row will be active when this statement is executed. Rather than get involved in decimal-binary conversions, you can also use a statement like: LET A = IN (256 * BIN 11111110 + 254) to do the same thing. Note too, that you can put a zero in any position, or in any number of positions, in the binary number and simultaneously scan any combination of rows with a single statement. (But, if you scan two rows at once, you cannot tell which row of the two a pressed key is in.) The BASIC equivalent of K-SCAN can be produced, of course, using eight IN statements. But unlike K-SCAN, you can detect the pressing of more than two keys.

Mike Manis

PROGRAMMER'S CORNER

Here is something I picked up from Chuck Dawson in the North Users' Group Newsletter. Did you know that you have access from the keyboard to all of the PRINT options, besides INVERSE? They are accessed from the extended mode, which is reached by pushing the CAPS SHIFT and SYMBOL SHIFT at the same time. They are:

```
EXTENDED MODE
0-7 PAPER color
8 BRIGHT off
9 BRIGHT on
SHIFT 0-7 INK color
8 FLASH off
9 FLASH on
```

You ask, "But Chris, how does this work?" Well, when you push these keys, the computer inserts what is known as control characters. Try this:

```
10 LET A$ = "I Love My Wife"
20 LET A$11 = CHR$ 13
30 LET A$12 = "1"
40 PRINT AT 0,0;A$
RUN
```

If you look on page 240 of your user's guide, you will see that character 13 controls FLASH. The "1" character turns the flash on. Add this

```
40 LET A$11 = CHR$13
50 LET A$12 = "0"
RUN
```

Using the same CHR\$13 followed by a zero turns flash off. What if you use CHR\$13 without a 0 or 1 following it? That's right! You get an INVALID COLOR error. BRIGHT is CHR\$19 and INVERSE is CHR\$20, and they both work the same way as FLASH.

The INK control (CHR\$15) and PAPER control (CHR\$17) work in a similar way, but the number that follows is the color number and should be 0-7.

Can you figure out how to use any of the other control characters?

EXTRA RAM

If you plug in the 16K Ram pack and find that the CLS function works more slowly and animation programs become unacceptable, try this it might help.

To have the maximum amount of RAM available while also having a fast CLS, adjust RANTOP before typing or loading programs.

```
POKE 16188,254
POKE 16189,76
NEW
```

sinclair

PROGRAMS

Banta Software has provided an interesting program to us

ON/OFF status of TS2040 printer

"As must be obvious, the REMark statement is a short machine code routine which must be the first line of the program. The other lines can be anywhere in the program and could be modified to give other messages. In the 1000/1500 version the inverse character in line 1 is "S". Also the less than/greater than in the 2068 version and the less than/equal in the 1000/1500 version are each single key-stroke entries.

2068 Version

```
1 REM FLASH CLS C THEN LN
9996 LET PRT=USR 13:PEEK 23560
50:PEEK 23560
9997 IF PRT=16181 THEN PRINT "PR
INTER ON"
9998 IF PRT=16343 THEN PRINT "P
RINTER OFF"
9999 STOP
```

1000/1500 Version

```
1 REM - CLS PEEK 254
2 PEEK 16516,71
9996 LET PRT=USR 16516
9997 IF PRT=16383 THEN PRINT "PR
INTER OFF"
9998 IF PRT=16343 THEN PRINT "P
RINTER ON"
9999 STOP
```

CCATS * AB/LEN

$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

(2) *analysis*—examined in relation to the first three research hypotheses which predicted that the perceived (a) *value* of the service will be higher for those who have used the service than for those who have not used the service; (b) *quality* of the service will be higher for those who have used the service than for those who have not used the service; and (c) *cost* of the service will be lower for those who have used the service than for those who have not used the service. All three research hypotheses were supported.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	5
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Sample	χ^2	ν	P	Model	Model χ^2	ν	P
1	1.0	1	0.32	1	1.0	1	0.32
2	1.0	1	0.32	1	1.0	1	0.32
3	1.0	1	0.32	1	1.0	1	0.32
4	1.0	1	0.32	1	1.0	1	0.32
5	1.0	1	0.32	1	1.0	1	0.32
6	1.0	1	0.32	1	1.0	1	0.32
7	1.0	1	0.32	1	1.0	1	0.32
8	1.0	1	0.32	1	1.0	1	0.32
9	1.0	1	0.32	1	1.0	1	0.32
10	1.0	1	0.32	1	1.0	1	0.32
11	1.0	1	0.32	1	1.0	1	0.32
12	1.0	1	0.32	1	1.0	1	0.32
13	1.0	1	0.32	1	1.0	1	0.32
14	1.0	1	0.32	1	1.0	1	0.32
15	1.0	1	0.32	1	1.0	1	0.32
16	1.0	1	0.32	1	1.0	1	0.32
17	1.0	1	0.32	1	1.0	1	0.32
18	1.0	1	0.32	1	1.0	1	0.32
19	1.0	1	0.32	1	1.0	1	0.32
20	1.0	1	0.32	1	1.0	1	0.32
21	1.0	1	0.32	1	1.0	1	0.32
22	1.0	1	0.32	1	1.0	1	0.32
23	1.0	1	0.32	1	1.0	1	0.32
24	1.0	1	0.32	1	1.0	1	0.32
25	1.0	1	0.32	1	1.0	1	0.32
26	1.0	1	0.32	1	1.0	1	0.32
27	1.0	1	0.32	1	1.0	1	0.32
28	1.0	1	0.32	1	1.0	1	0.32
29	1.0	1	0.32	1	1.0	1	0.32
30	1.0	1	0.32	1	1.0	1	0.32
31	1.0	1	0.32	1	1.0	1	0.32
32	1.0	1	0.32	1	1.0	1	0.32
33	1.0	1	0.32	1	1.0	1	0.32
34	1.0	1	0.32	1	1.0	1	0.32
35	1.0	1	0.32	1	1.0	1	0.32
36	1.0	1	0.32	1	1.0	1	0.32
37	1.0	1	0.32	1	1.0	1	0.32
38	1.0	1	0.32	1	1.0	1	0.32
39	1.0	1	0.32	1	1.0	1	0.32
40	1.0	1	0.32	1	1.0	1	0.32
41	1.0	1	0.32	1	1.0	1	0.32
42	1.0	1	0.32	1	1.0	1	0.32
43	1.0	1	0.32	1	1.0	1	0.32
44	1.0	1	0.32	1	1.0	1	0.32
45	1.0	1	0.32	1	1.0	1	0.32
46	1.0	1	0.32	1	1.0	1	0.32
47	1.0	1	0.32	1	1.0	1	0.32
48	1.0	1	0.32	1	1.0	1	0.32
49	1.0	1	0.32	1	1.0	1	0.32
50	1.0	1	0.32	1	1.0	1	0.32
51	1.0	1	0.32	1	1.0	1	0.32
52	1.0	1	0.32	1	1.0	1	0.32
53	1.0	1	0.32	1	1.0	1	0.32
54	1.0	1	0.32	1	1.0	1	0.32

and the other two are the same as those used by the authors of [1]. The first one is the "simplest" one, which is obtained by taking the average of the three values of α calculated from the three different methods. The second one is the "weighted" one, which is obtained by taking the weighted average of the three values of α , where the weights are the inverse of the standard deviations of the three values.

[illegible][illegible][illegible][illegible]

the first year (1970-71) the seed yield (t/ha) was 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0, 5.2, 5.4, 5.6, 5.8, 6.0, 6.2, 6.4, 6.6, 6.8, 7.0, 7.2, 7.4, 7.6, 7.8, 8.0, 8.2, 8.4, 8.6, 8.8, 9.0, 9.2, 9.4, 9.6, 9.8, 10.0, 10.2, 10.4, 10.6, 10.8, 11.0, 11.2, 11.4, 11.6, 11.8, 12.0, 12.2, 12.4, 12.6, 12.8, 13.0, 13.2, 13.4, 13.6, 13.8, 14.0, 14.2, 14.4, 14.6, 14.8, 15.0, 15.2, 15.4, 15.6, 15.8, 16.0, 16.2, 16.4, 16.6, 16.8, 17.0, 17.2, 17.4, 17.6, 17.8, 18.0, 18.2, 18.4, 18.6, 18.8, 19.0, 19.2, 19.4, 19.6, 19.8, 20.0, 20.2, 20.4, 20.6, 20.8, 21.0, 21.2, 21.4, 21.6, 21.8, 22.0, 22.2, 22.4, 22.6, 22.8, 23.0, 23.2, 23.4, 23.6, 23.8, 24.0, 24.2, 24.4, 24.6, 24.8, 25.0, 25.2, 25.4, 25.6, 25.8, 26.0, 26.2, 26.4, 26.6, 26.8, 27.0, 27.2, 27.4, 27.6, 27.8, 28.0, 28.2, 28.4, 28.6, 28.8, 29.0, 29.2, 29.4, 29.6, 29.8, 30.0, 30.2, 30.4, 30.6, 30.8, 31.0, 31.2, 31.4, 31.6, 31.8, 32.0, 32.2, 32.4, 32.6, 32.8, 33.0, 33.2, 33.4, 33.6, 33.8, 34.0, 34.2, 34.4, 34.6, 34.8, 35.0, 35.2, 35.4, 35.6, 35.8, 36.0, 36.2, 36.4, 36.6, 36.8, 37.0, 37.2, 37.4, 37.6, 37.8, 38.0, 38.2, 38.4, 38.6, 38.8, 39.0, 39.2, 39.4, 39.6, 39.8, 40.0, 40.2, 40.4, 40.6, 40.8, 41.0, 41.2, 41.4, 41.6, 41.8, 42.0, 42.2, 42.4, 42.6, 42.8, 43.0, 43.2, 43.4, 43.6, 43.8, 44.0, 44.2, 44.4, 44.6, 44.8, 45.0, 45.2, 45.4, 45.6, 45.8, 46.0, 46.2, 46.4, 46.6, 46.8, 47.0, 47.2, 47.4, 47.6, 47.8, 48.0, 48.2, 48.4, 48.6, 48.8, 49.0, 49.2, 49.4, 49.6, 49.8, 50.0, 50.2, 50.4, 50.6, 50.8, 51.0, 51.2, 51.4, 51.6, 51.8, 52.0, 52.2, 52.4, 52.6, 52.8, 53.0, 53.2, 53.4, 53.6, 53.8, 54.0, 54.2, 54.4, 54.6, 54.8, 55.0, 55.2, 55.4, 55.6, 55.8, 56.0, 56.2, 56.4, 56.6, 56.8, 57.0, 57.2, 57.4, 57.6, 57.8, 58.0, 58.2, 58.4, 58.6, 58.8, 59.0, 59.2, 59.4, 59.6, 59.8, 60.0, 60.2, 60.4, 60.6, 60.8, 61.0, 61.2, 61.4, 61.6, 61.8, 62.0, 62.2, 62.4, 62.6, 62.8, 63.0, 63.2, 63.4, 63.6, 63.8, 64.0, 64.2, 64.4, 64.6, 64.8, 65.0, 65.2, 65.4, 65.6, 65.8, 66.0, 66.2, 66.4, 66.6, 66.8, 67.0, 67.2, 67.4, 67.6, 67.8, 68.0, 68.2, 68.4, 68.6, 68.8, 69.0, 69.2, 69.4, 69.6, 69.8, 70.0, 70.2, 70.4, 70.6, 70.8, 71.0, 71.2, 71.4, 71.6, 71.8, 72.0, 72.2, 72.4, 72.6, 72.8, 73.0, 73.2, 73.4, 73.6, 73.8, 74.0, 74.2, 74.4, 74.6, 74.8, 75.0, 75.2, 75.4, 75.6, 75.8, 76.0, 76.2, 76.4, 76.6, 76.8, 77.0, 77.2, 77.4, 77.6, 77.8, 78.0, 78.2, 78.4, 78.6, 78.8, 79.0, 79.2, 79.4, 79.6, 79.8, 80.0, 80.2, 80.4, 80.6, 80.8, 81.0, 81.2, 81.4, 81.6, 81.8, 82.0, 82.2, 82.4, 82.6, 82.8, 83.0, 83.2, 83.4, 83.6, 83.8, 84.0, 84.2, 84.4, 84.6, 84.8, 85.0, 85.2, 85.4, 85.6, 85.8, 86.0, 86.2, 86.4, 86.6, 86.8, 87.0, 87.2, 87.4, 87.6, 87.8, 88.0, 88.2, 88.4, 88.6, 88.8, 89.0, 89.2, 89.4, 89.6, 89.8, 90.0, 90.2, 90.4, 90.6, 90.8, 91.0, 91.2, 91.4, 91.6, 91.8, 92.0, 92.2, 92.4, 92.6, 92.8, 93.0, 93.2, 93.4, 93.6, 93.8, 94.0, 94.2, 94.4, 94.6, 94.8, 95.0, 95.2, 95.4, 95.6, 95.8, 96.0, 96.2, 96.4, 96.6, 96.8, 97.0, 97.2, 97.4, 97.6, 97.8, 98.0, 98.2, 98.4, 98.6, 98.8, 99.0, 99.2, 99.4, 99.6, 99.8, 100.0, 100.2, 100.4, 100.6, 100.8, 101.0, 101.2, 101.4, 101.6, 101.8, 102.0, 102.2, 102.4, 102.6, 102.8, 103.0, 103.2, 103.4, 103.6, 103.8, 104.0, 104.2, 104.4, 104.6, 104.8, 105.0, 105.2, 105.4, 105.6, 105.8, 106.0, 106.2, 106.4, 106.6, 106.8, 107.0, 107.2, 107.4, 107.6, 107.8, 108.0, 108.2, 108.4, 108.6, 108.8, 109.0, 109.2, 109.4, 109.6, 109.8, 110.0, 110.2, 110.4, 110.6, 110.8, 111.0, 111.2, 111.4, 111.6, 111.8, 112.0, 112.2, 112.4, 112.6, 112.8, 113.0, 113.2, 113.4, 113.6, 113.8, 114.0, 114.2, 114.4, 114.6, 114.8, 115.0, 115.2, 115.4, 115.6, 115.8, 116.0, 116.2, 116.4, 116.6, 116.8, 117.0, 117.2, 117.4, 117.6, 117.8, 118.0, 118.2, 118.4, 118.6, 118.8, 119.0, 119.2, 119.4, 119.6, 119.8, 120.0, 120.2, 120.4, 120.6, 120.8, 121.0, 121.2, 121.4, 121.6, 121.8, 122.0, 122.2, 122.4, 122.6, 122.8, 123.0, 123.2, 123.4, 123.6, 123.8, 124.0, 124.2, 124.4, 124.6, 124.8, 125.0, 125.2, 125.4, 125.6, 125.8, 126.0, 126.2, 126.4, 126.6, 126.8, 127.0, 127.2, 127.4, 127.6, 127.8, 128.0, 128.2, 128.4, 128.6, 128.8, 129.0, 129.2, 129.4, 129.6, 129.8, 130.0, 130.2, 130.4, 130.6, 130.8, 131.0, 131.2, 131.4, 131.6, 131.8, 132.0, 132.2, 132.4, 132.6,

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1000°C (2300°F) for 1 hr. The samples were cooled at 100°C/min to 500°C (930°F) and then cooled to room temperature. The samples were then annealed at 275, 315, 355, 395, 435, 475, 515, 555, 595, 635, 675, 715, 755, 795, 835, 875, 915, 955, 995, 1035, 1075, 1115, 1155, 1195, 1235, 1275, 1315, 1355, 1395, 1435, 1475, 1515, 1555, 1595, 1635, 1675, 1715, 1755, 1795, 1835, 1875, 1915, 1955, 1995, 2035, 2075, 2115, 2155, 2195, 2235, 2275, 2315, 2355, 2395, 2435, 2475, 2515, 2555, 2595, 2635, 2675, 2715, 2755, 2795, 2835, 2875, 2915, 2955, 2995, 3035, 3075, 3115, 3155, 3195, 3235, 3275, 3315, 3355, 3395, 3435, 3475, 3515, 3555, 3595, 3635, 3675, 3715, 3755, 3795, 3835, 3875, 3915, 3955, 3995, 4035, 4075, 4115, 4155, 4195, 4235, 4275, 4315, 4355, 4395, 4435, 4475, 4515, 4555, 4595, 4635, 4675, 4715, 4755, 4795, 4835, 4875, 4915, 4955, 4995, 5035, 5075, 5115, 5155, 5195, 5235, 5275, 5315, 5355, 5395, 5435, 5475, 5515, 5555, 5595, 5635, 5675, 5715, 5755, 5795, 5835, 5875, 5915, 5955, 5995, 6035, 6075, 6115, 6155, 6195, 6235, 6275, 6315, 6355, 6395, 6435, 6475, 6515, 6555, 6595, 6635, 6675, 6715, 6755, 6795, 6835, 6875, 6915, 6955, 6995, 7035, 7075, 7115, 7155, 7195, 7235, 7275, 7315, 7355, 7395, 7435, 7475, 7515, 7555, 7595, 7635, 7675, 7715, 7755, 7795, 7835, 7875, 7915, 7955, 7995, 8035, 8075, 8115, 8155, 8195, 8235, 8275, 8315, 8355, 8395, 8435, 8475, 8515, 8555, 8595, 8635, 8675, 8715, 8755, 8795, 8835, 8875, 8915, 8955, 8995, 9035, 9075, 9115, 9155, 9195, 9235, 9275, 9315, 9355, 9395, 9435, 9475, 9515, 9555, 9595, 9635, 9675, 9715, 9755, 9795, 9835, 9875, 9915, 9955, 9995, 10035, 10075, 10115, 10155, 10195, 10235, 10275, 10315, 10355, 10395, 10435, 10475, 10515, 10555, 10595, 10635, 10675, 10715, 10755, 10795, 10835, 10875, 10915, 10955, 10995, 11035, 11075, 11115, 11155, 11195, 11235, 11275, 11315, 11355, 11395, 11435, 11475, 11515, 11555, 11595, 11635, 11675, 11715, 11755, 11795, 11835, 11875, 11915, 11955, 11995, 12035, 12075, 12115, 12155, 12195, 12235, 12275, 12315, 12355, 12395, 12435, 12475, 12515, 12555, 12595, 12635, 12675, 12715, 12755, 12795, 12835, 12875, 12915, 12955, 12995, 13035, 13075, 13115, 13155, 13195, 13235, 13275, 13315, 13355, 13395, 13435, 13475, 13515, 13555, 13595, 13635, 13675, 13715, 13755, 13795, 13835, 13875, 13915, 13955, 13995, 14035, 14075, 14115, 14155, 14195, 14235, 14275, 14315, 14355, 14395, 14435, 14475, 14515, 14555, 14595, 14635, 14675, 14715, 14755, 14795, 14835, 14875, 14915, 14955, 14995, 15035, 15075, 15115, 15155, 15195, 15235, 15275, 15315, 15355, 15395, 15435, 15475, 15515, 15555, 15595, 15635, 15675, 15715, 15755, 15795, 15835, 15875, 15915, 15955, 15995, 16035, 16075, 16115, 16155, 16195, 16235, 16275, 16315, 16355, 16395, 16435, 16475, 16515, 16555, 16595, 16635, 16675, 16715, 16755, 16795, 16835, 16875, 16915, 16955, 16995, 17035, 17075, 17115, 17155, 17195, 17235, 17275, 17315, 17355, 17395, 17435, 17475, 17515, 17555, 17595, 17635, 17675, 17715, 17755, 17795, 17835, 17875, 17915, 17955, 17995, 18035, 18075, 18115, 18155, 18195, 18235, 18275, 18315, 18355, 18395, 18435, 18475, 18515, 18555, 18595, 18635, 18675, 18715, 18755, 18795, 18835, 18875, 18915, 18955, 18995, 19035, 19075, 19115, 19155, 19195, 19235, 19275, 19315, 19355, 19395, 19435, 19475, 19515, 19555, 19595, 19635, 19675, 19715, 19755, 19795, 19835, 19875, 19915, 19955, 19995, 20035, 20075, 20115, 20155, 20195, 20235, 20275, 20315, 20355, 20395, 20435, 20475, 20515, 20555, 20595, 20635, 20675, 20715, 20755, 20795, 20835, 20875, 20915, 20955, 20995, 21035, 21075, 21115, 21155, 21195, 21235, 21275, 21315, 21355, 21395, 21435, 21475, 21515, 21555, 21595, 21635, 21675, 21715, 21755, 21795, 21835, 21875, 21915, 21955, 21995, 22035, 22075, 22115, 22155, 22195, 22235, 22275, 22315, 22355, 22395, 22435, 22475, 22515, 22555, 22595, 22635, 22675, 22715, 22755, 22795, 22835, 22875, 22915, 22955, 22995, 23035, 23075, 23115, 23155, 23195, 23235, 23275, 23315, 23355, 23395, 23435, 23475, 23515, 23555, 23595, 23635, 23675, 23715, 23755, 23795, 23835, 23875, 23915, 23955, 23995, 24035, 24075, 24115, 24155, 24195, 24235, 24275, 24315, 24355, 24395, 24435, 24475, 24515, 24555, 24595, 24635, 24675, 24715, 24755, 24795, 2

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allowing the length of the critical path to be reduced by 10 days, and increasing the project cost by \$100,000. The project manager is considering the following alternatives:

1. Reduce the length of activity 1 by 10 days, at a cost of \$100,000.
2. Reduce the length of activity 2 by 10 days, at a cost of \$100,000.
3. Reduce the length of activity 3 by 10 days, at a cost of \$100,000.
4. Reduce the length of activity 4 by 10 days, at a cost of \$100,000.
5. Reduce the length of activity 5 by 10 days, at a cost of \$100,000.
6. Reduce the length of activity 6 by 10 days, at a cost of \$100,000.
7. Reduce the length of activity 7 by 10 days, at a cost of \$100,000.
8. Reduce the length of activity 8 by 10 days, at a cost of \$100,000.
9. Reduce the length of activity 9 by 10 days, at a cost of \$100,000.
10. Reduce the length of activity 10 by 10 days, at a cost of \$100,000.

1. With the leader from the previous session.

6. "Special" in this case does not refer to the fact that the "special" line is a line of the "special" type, but to the fact that the "special" line is a line of the "special" type.

These results show that the α -phase is more abundant than the β -phase in the $\text{Al}_{1-x}\text{Fe}_x$ alloys. The α -phase is the main phase in the $\text{Al}_{0.9}\text{Fe}_{0.1}$ alloy, and the β -phase is the main phase in the $\text{Al}_{0.7}\text{Fe}_{0.3}$ alloy. The α -phase is the main phase in the $\text{Al}_{0.5}\text{Fe}_{0.5}$ alloy, and the β -phase is the main phase in the $\text{Al}_{0.3}\text{Fe}_{0.7}$ alloy. The α -phase is the main phase in the $\text{Al}_{0.1}\text{Fe}_{0.9}$ alloy, and the β -phase is the main phase in the $\text{Al}_{0.0}\text{Fe}_{1.0}$ alloy.

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